

SEP 12 1938



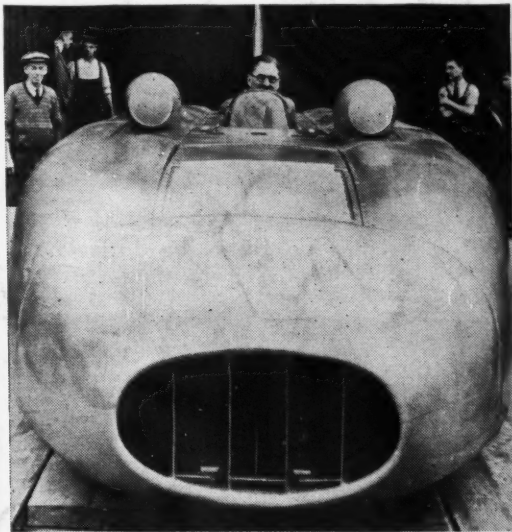
# MOTOR AGE

CHILTON PUBLICATION

DEVOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

SEPTEMBER  
1938

## IN THIS ISSUE



Captain George Eyston seated in the cockpit of the "Thunderbolt" with which, on August 27, he established a new speed record for the mile at 345.49 m.p.h.

### **Servicing the Marvel Carburetor**

Twenty-one illustrations showing step by step everything you need know in tackling this job.

### **You Lose When They Score**

What causes bearing failures? Here's some results of a study made to find the answer to that question.

### **Facing Facts on Valves**

Rapid advance of the automobile industry has meant many changes in valves and valve seats. Here's how a leading company keeps pace with the changes.

### **Ab Jenkins' Speed Bid**

America's only hope for the world mile title this year grooms his mount for the Bonneville chase.

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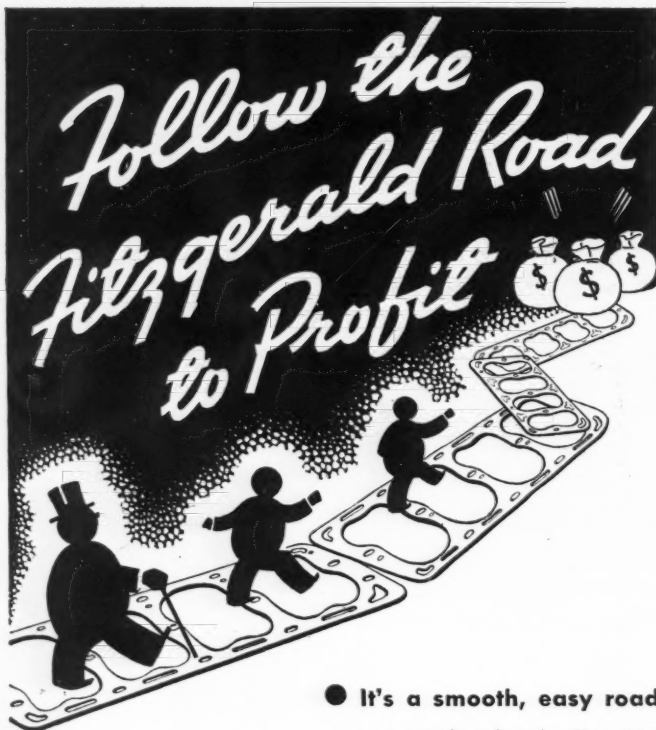
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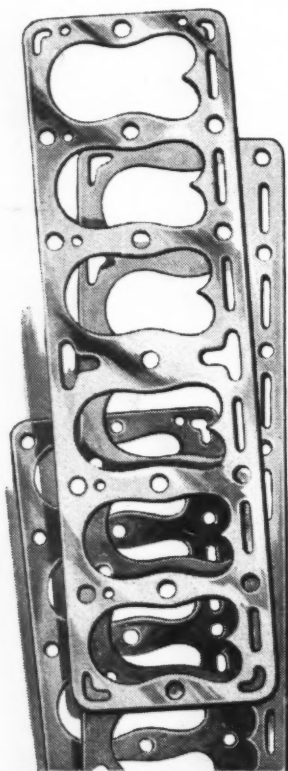
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# MOTOR AGE

DEVOTED TO THE INTERESTS OF THE INDEPENDENT REPAIR SHOP

Subscriptions for Motor Age are accepted only from independent repair shops and their employees.

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# MOTOR AGE

SEPTEMBER 1938



## SHOP TALK

### Cheat

During school days they called it cheating, but after graduation it's smart business to keep one eye on your competitor to see what he is doing.

### Miss

Julian Chase, returning from his vacation in the wilds of darkest Connecticut, entered my office with fire in his steel-blue eyes. Tell those readers of yours, for gosh sakes, to look at and check the battery terminals each time they put water in a starting battery! (His words were somewhat more emphatic, but you get the idea.) It seems that Julian has been trying to get various and sundry repair shops to locate an engine miss for the last six months. Then on his vacation, far from the madding

throng, his car quit, cold. The trouble? A poor battery connection, which should have been located months ago, and it would have been if the man that filled the battery would have been on the job.

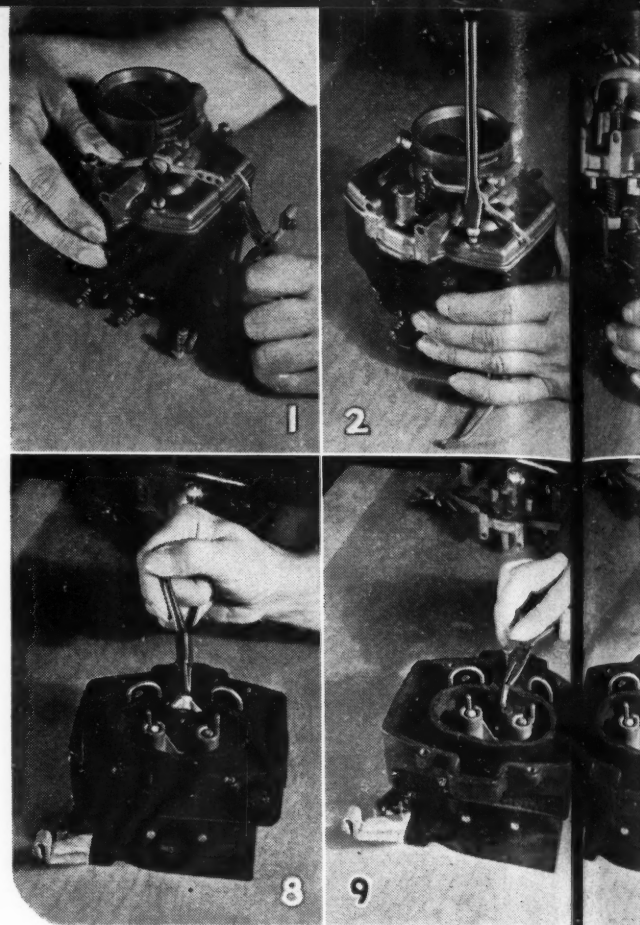
### Letters

Well, I am still getting letters on that "Performance Requires Perfect Timing" article. Among others I received one from D. K. Cummings, of the Berkeley Service Station in Santa Monica, Cal., and another from John C. Pyle, of Salina, Kan. I'm still trying to make up my mind in regards to printing them. The trouble is not with what they write, but recent letters have strayed from the original argument. Both Pyle and Cummings seem to argue on the relative merits of Ethyl and non-leaded fuels. That wasn't the point. The

original article stated that to get the most out of gasoline the ignition should be timed for each particular fuel. Probably the best way would be to use a chassis dynamometer, but as they are rather expensive, another method was suggested. The new electric tachometers could be used, or the speedometer on the car could be used by jacking up the rear wheels. The original argument started on the merits of the timing method outlined. However, if you all want to change it to arguing about different types of gasoline, it's ok with me. If enough of you write in, I'll publish some of the more recent letters which, seemingly, have strayed a bit from the original line of thought.

*Bill Toboak*

- 1—Remove cotter pin and disconnect pump connecting rod.
- 2—Remove screws holding bowl cover and air inlet.
- 3—Lift bowl cover and air inlet assembly off carburetor bowl.
- 4—Turn metering pin stop bracket screw half turn to release metering pin lifter.
- 5—Remove metering pins and vacuum step-up piston assembly.
- 6—Remove vacuum step-up piston spring.
- 7—Remove screw holding pump discharge jet.
- 8—Remove pump discharge jet.
- 9—Remove pump discharge check valve.
- 10—Remove accelerating pump inlet ball valve assembly.
- 11—Remove nozzle plug.

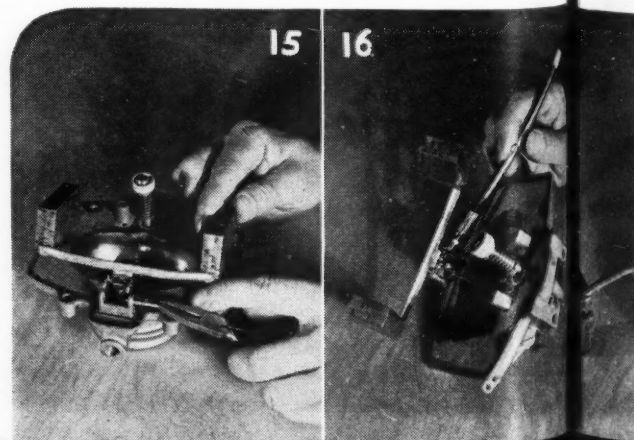


# *Servicing the* **Marvel**

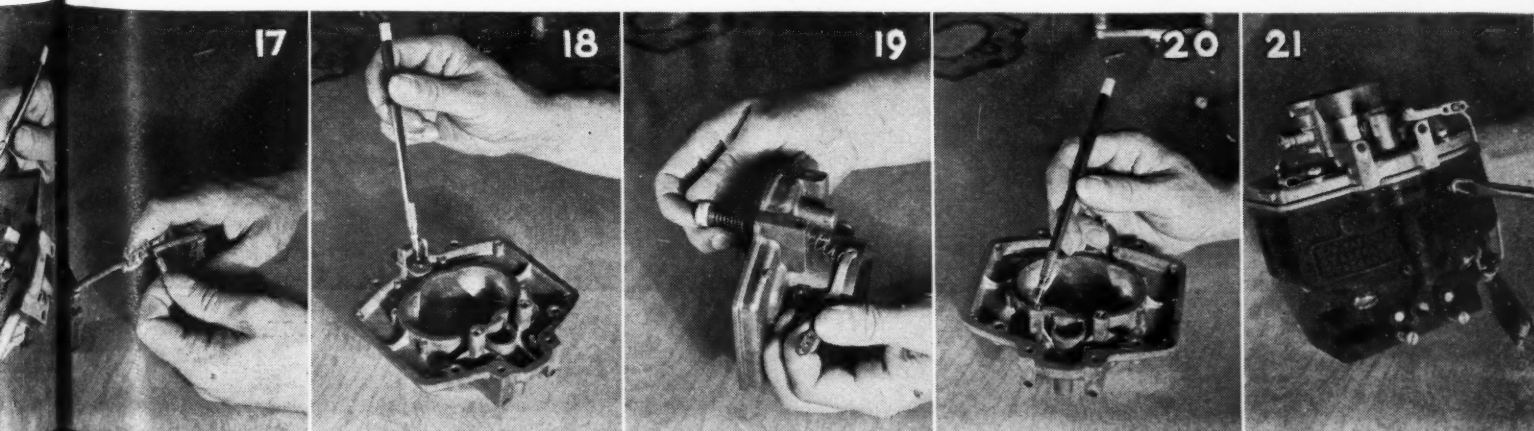
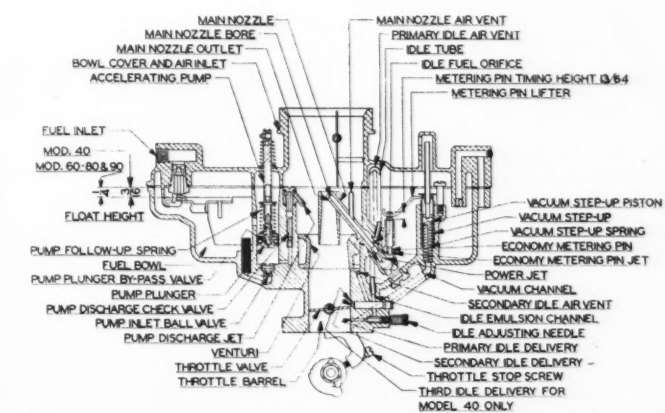
by  
**BOB TURNER**

- 12—Remove metering pin housing plug screw. To remove power jet it is necessary to use special jet wrench.
- 13—Remove pump inlet screen. This screen lifts out.
- 14—Remove both idle adjusting needles.
- 15—Remove float lever shaft.
- 16—To change float level bend U shaped ends that hold needle valve.
- 17—Needle lifts out with float can be removed by sliding off of U shaped retainer.
- 18—Remove needle seat from bowl cover casting by using proper size socket wrench.
- 19—Remove accelerating pump plunger by removing cotter pin.
- 20—Clean air vents thoroughly with air pressure.
- 21—Remove gas level inspection screw to check fuel height in bowl.

22 and 23—Sectional views of Marvel Carburetor. General: Clean all parts thoroughly in acetone before reassembling. To assemble reverse above operations. Use all new gaskets in reassembling. Test all check valves for leakage and replace where necessary. Use special tools where necessary—otherwise poor operation of carburetor can be expected.



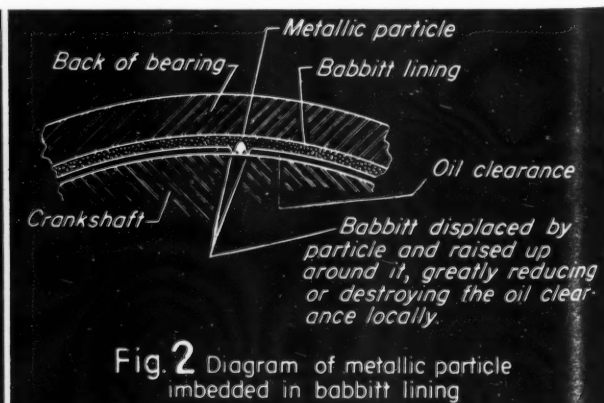






# You Lose When They

**The Federal-Mogul Corp. has studied various causes of bearing failure — here's what they found.**







# Score

We are indebted to A. B. Willi, chief engineer of the Federal-Mogul Corp., for the illustrations and material used in preparation of this article.

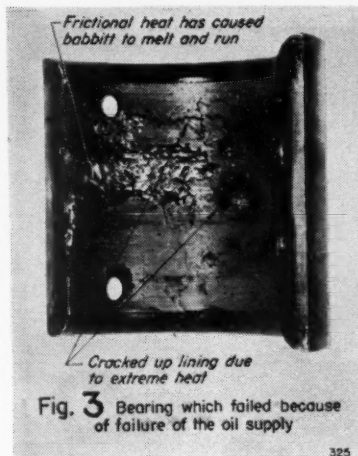


Fig. 3 Bearing which failed because of failure of the oil supply

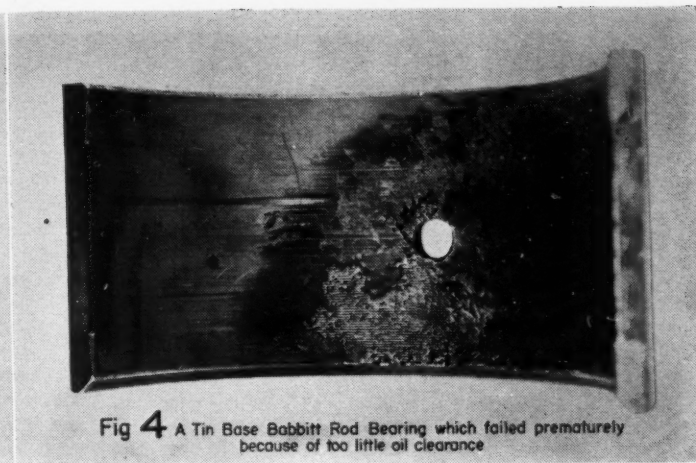


Fig. 4 A Tin Base Babbitt Rod Bearing which failed prematurely because of too little oil clearance

WHEN thin-wall, precision type replaceable main and connecting rod bearings were first introduced in the automobile engine, the mechanic heaved a sigh of relief. Here was a bearing that could be replaced without having to pull the job down and without having to scrape, ream or otherwise fit the new bearing. Just roll out the old and roll in the new.

And so it has worked out in practice. Long life with a minimum of bearing failure, easy replacement when replacement is necessary, and a repair job that is free from the chances of error that existed in the old days of reaming, scraping, bluing, tightening and testing.

When bearing failures do occur, the bearings themselves give a pretty good indication of the cause if one can but read the sign language in which the bearing tells its story. For many years, bearing failures were usually attributed to either poor bond or inferior babbitt, but with the careful examination of a great many failed bearings it soon became apparent that these were not the only causes. A special program for studying the various causes of bearing failure was instituted by the Federal-Mogul Corporation, under the direction of A. B. Willi, its chief engineer. The results of that study are of interest to engineers and mechanics alike.

The rotation of the crankshaft in its bearings causes friction, and friction creates heat; excessive heat is a major cause of failure. Heat in a bearing is carried away by the lubricating oil and by conduction through the bearing to cooler parts of the crankcase or rod. It is, therefore, necessary for the back of the bearing to have perfect con-

tact against its seat in the case or rod; otherwise the flow of heat away from the bearing surface is seriously interfered with. Fig. 1 shows how this occurs when dirt particles are caught between the bearing back and the rod or case; an air space is created preventing heat from being conducted away from that portion of the bearing, resulting in a localized hot spot and bearing failure at this point. If the dirt particle is of sufficient hardness to become embedded in the bearing back, it has the effect of creating a high spot in the bearing surface. This high spot is without lubrication and quickly rubs away, causing premature bearing failure.

Fine metallic particles worn from cylinder wall, piston rings or other working parts, or grindings from a valve job or cylinder wall reconditioning operation are picked up by the oil and circulated to the bearings. These particles become embedded in the babbitt of the bearing, but in doing so they displace the babbitt and cause it to raise up, as shown in Fig. 2. Where the bearing metal is bulged up as shown, the oil clearance is greatly reduced or destroyed, causing a metal-to-metal contact. This results in a localized hot spot and rapid deterioration of the babbitt, and bond soon follows.

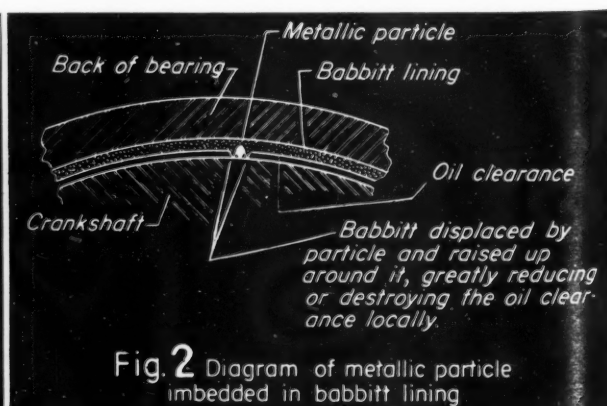
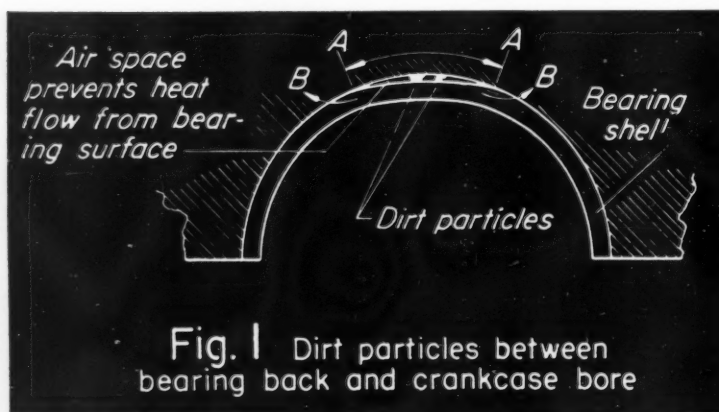
Insufficient clearance and failure of the oil supply are other causes of bearing failure. Fig. 3 shows a bearing that has cracked and burned because of oil failure. Failure of the oil supply does not necessarily mean that all the oil in the engine has been consumed or leaked out. Oil sludge formations or sludge emulsions may have

(Continued on page 63)



# *You* Lose When They

**The Federal-Mogul Corp. has studied various causes of bearing failure — here's what they found.**





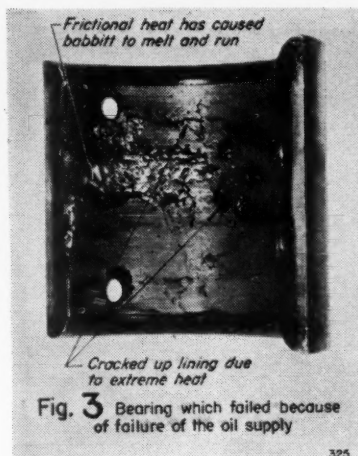
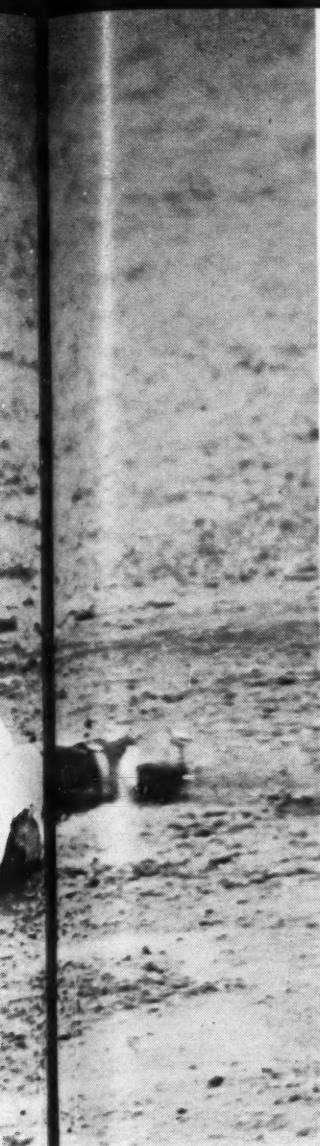


Fig. 3 Bearing which failed because of failure of the oil supply

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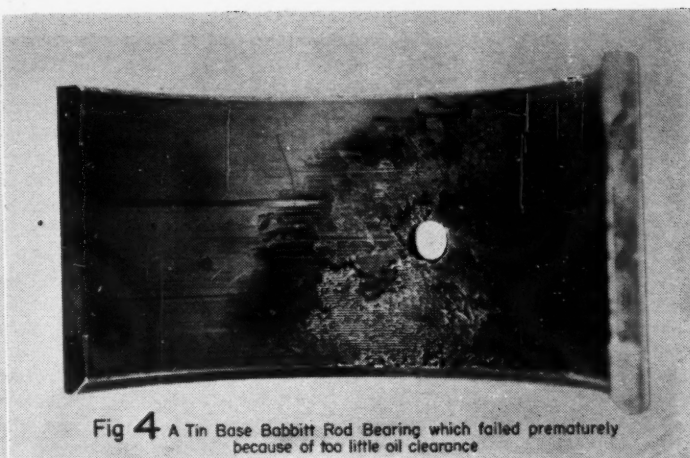


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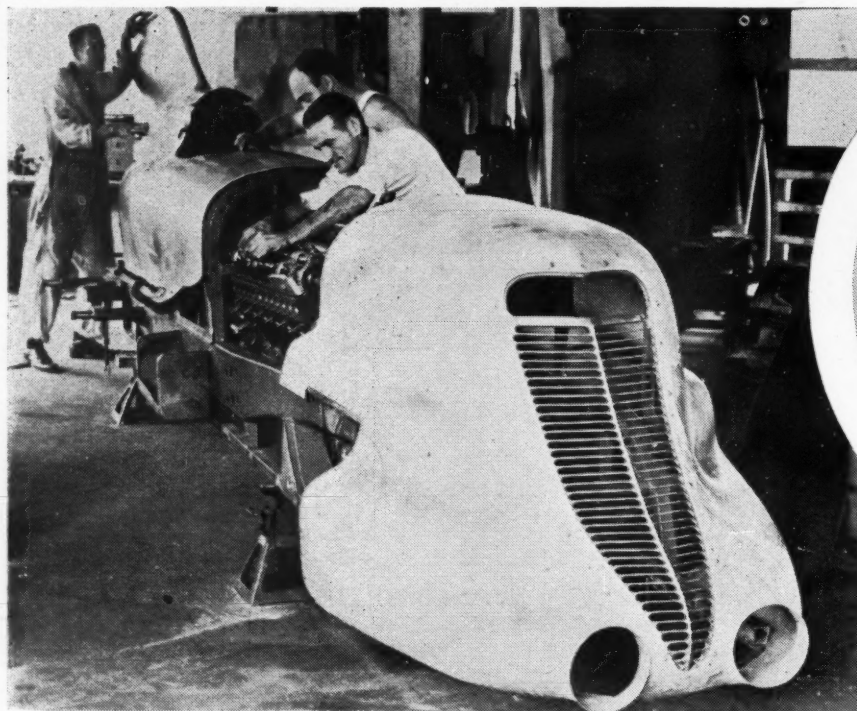
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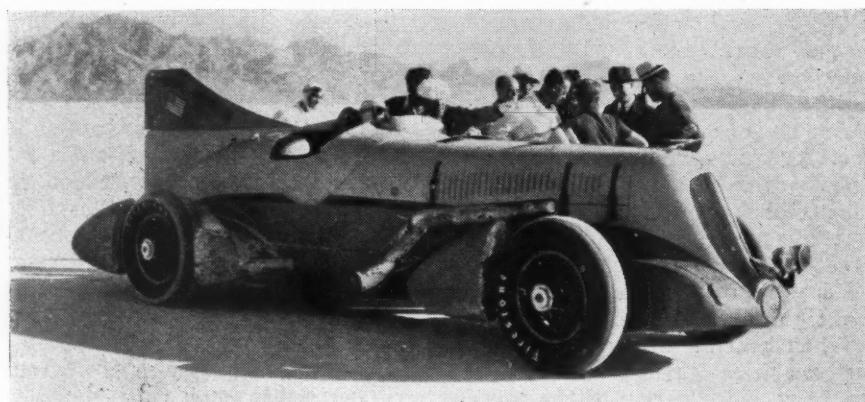
(Continued on page 63)

# Score

We are indebted to A. B. Willi, chief engineer of the Federal-Mogul Corp., for the illustrations and material used in preparation of this article.



Ab Jenkins' smile of confidence just before he established 87 new records on his run last year.



(Top) Work is progressing on Jenkins' new car to which, after again making distance runs this summer, he will add another Curtiss Conqueror engine in the hope of setting a new mile record. (Lower) Ab Jenkins receiving the well-wishes of his crew just prior to his 24-hour run last year.

# Ab Jenkins' Speed Bid

**America hopes he'll bring the crown back to this country**

**By  
ART WRIGHT**

BRITAIN'S ten-year monopoly of super-speed records is destined for early end . . . or America's Ab Jenkins has been sitting up nights with the wrong specifications.

A year ago—when Capt. George Eyston zoomed over Utah's Bonneville Saltbed at 311.42 m.p.h. to dethrone his fellow countryman, Sir Malcolm Campbell—Jenkins began definite preparations for an assault on the mile straightaway mark.

Six months ago construction of a two-engined high speed powerplant was started at Indianapolis, and on the day this is written, Jenkins told the writer he would definitely make an attempt on the straightaway record in November.

Adhering to the contention of outstanding American engineers that monster cars are not necessary for fastest land speeds man ever has driven, Jenkins has prepared a car smaller than Eyston's "Thunderbolt" and John Cobb's "Railton."

And, a far cry from the British cars, the Jenkins "Mormon Meteor"—this one, "the Third"—follows conventional lines as closely as a super-speed car dares.

Two 12-cylinder Curtiss airplane engines, each of 1600 cu. in. displacement, will drive the 3-ton racer over the sleek salt surface. The motors will develop a total of 2400 hp. Eyston's "Thunderbolt" is rated at 3250 hp.

(Continued on page 66)





*"See, I told you it was too short—he distinctly said your skirt had too much clearance!"*



(Top) The complete Raybestos brake service department makes an attractive and useful repair shop display.

Raybestos provides practical instruction in brake servicing at its brake school.

ON a sunny week-end during one of the first summers to come in after the Gay Nineties went out, I took a couple of friends in a snappy new model automobile on a three-day tour of approximately 150 miles.

Measured by the motoring standards those days, the outward trip was not extraordinarily eventful. I had to pry off a tire now and then to patch an inner tube, but that was a part of the expected. I stopped occasionally, of course, to tighten a nut or two, to change a spark plug or adjust an ignition coil vibration. Those were things that one always had to do, every few miles, at that time.

The farthest point out on the route we took was somewhat higher above sea-level than our starting point. The first half of the journey, therefore, was, in its net result, a long climb up hill. There was plenty of low gear work and sometimes I had to stop to give the cooling water a chance to cool and let the engine get its breath. At such times one of my passengers would have to jump out quickly and put a stone or a piece of wood behind one of the wheels in order to keep the car from rolling backward down hill. The brakes with which those early cars were equipped, when they worked at all, worked one way only, forward but not backward.

My car had brakes that were lined with the best leather that money could buy. We bought leather for brake lining in those days because there was nothing better to be had. Sometimes we tried hard-wood, sometimes brass. We also tried cast-iron. We tried everything available but could not

find anything that would stand the gaff.

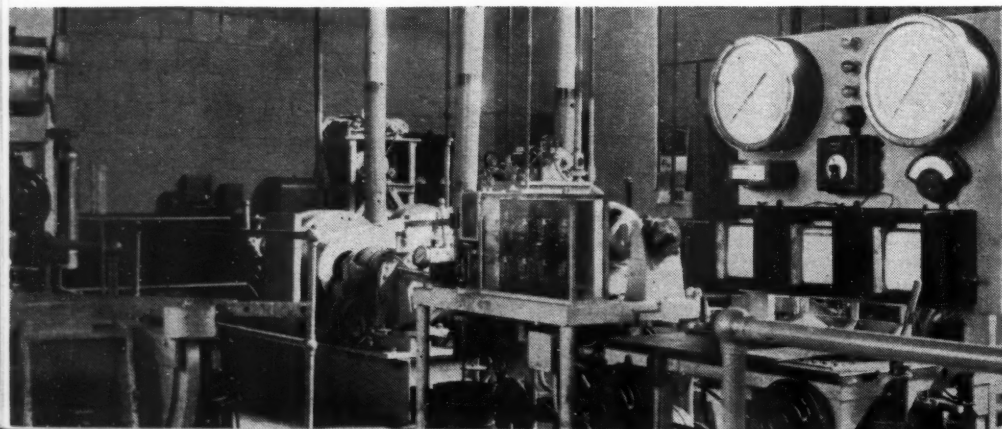
On the homeward run the going was mostly down hill. The brakes soon got hot, they smoked, they smelled and then they burned out completely. This happened in less than 25 miles. After that, on the steepest hills, I got down safely only by dragging a fence post along the road on the end of a rope behind me. At the bottom of each hill I put the fence post in with my passengers to have it on hand when the next steep down grade was reached. On level going, near the end of the tour, I coasted to a stop when I had plenty of room, or jumped out to hold the car if the stop didn't come soon enough.

With that picture in mind, does it seem strange that I was especially interested in an advertisement which I saw about then in an automobile magazine? The advertisement announced a two-way brake which was adaptable to any make of automobile. I bought several of them from time to time and installed them on cars at so much per installation. It was a good replacement item for the service men of that day.

But even this better, two-way brake needed better lining than was then generally available. The maker of the brake was a predecessor company of the Raybestos company, now the Raybestos division of Raybestos-Manhattan, Inc., and the necessity for better lining for the brake which it put out was the mother of the long series of inventions on which a mammoth modern business was built as an essential contributor to auto development.

Intensive experimenting with  
(Continued on page 52)

## Because a Better Brake



(Left) Section of physical testing laboratory at the Bridgeport, Conn., plant of the Raybestos division of Raybestos-Manhattan, Inc.



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Raybestos developed the first brake lining to stop cars going backward as well as forward. Known as the Duplex External Wrapping Brake, and equipped with the first asbestos lining, this was a high spot in automotive history. It was sensationally demonstrated on a specially-built runway atop the old Madison Square Garden in New York City.

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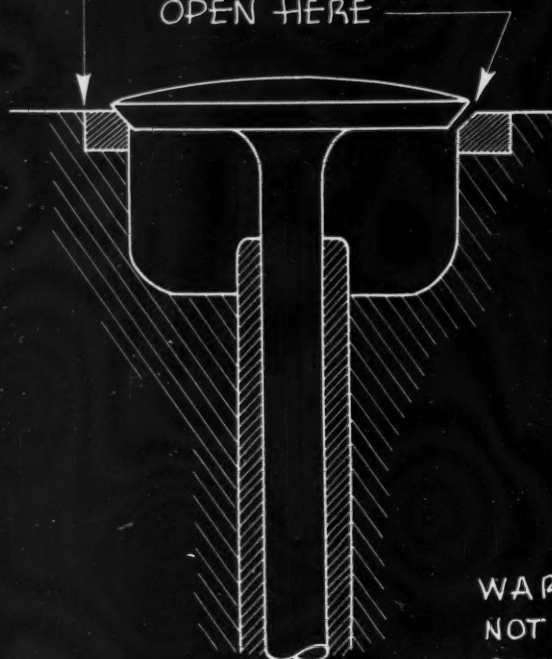
## Needed a Better Lining

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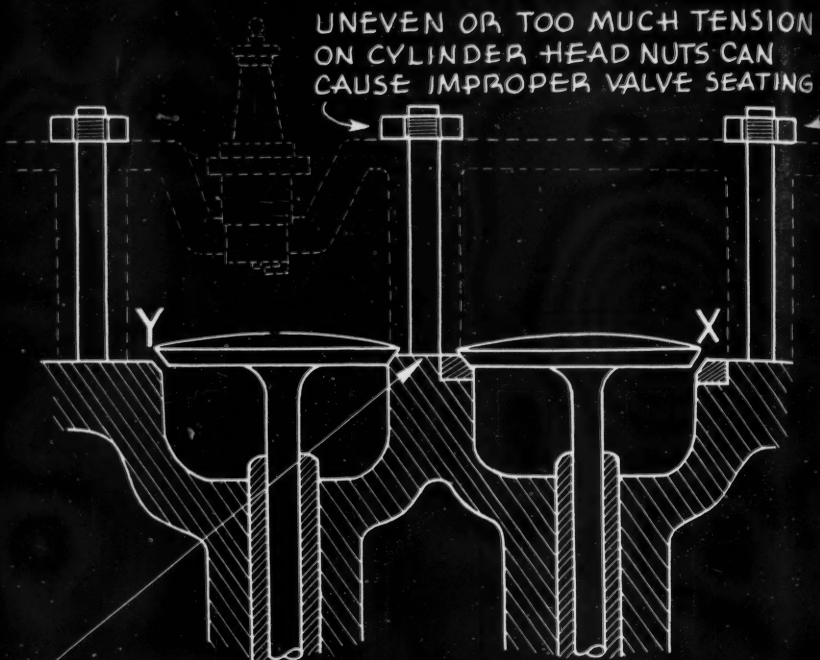
By  
**JULIAN CHASE**

**Raybestos has played a leading role in  
brake and brake lining development  
since the beginning of the industry**

DISTORTION HERE CAUSES  
VALVES TO BE HELD  
OPEN HERE



UNEVEN OR TOO MUCH TENSION  
ON CYLINDER HEAD NUTS CAN  
CAUSE IMPROPER VALVE SEATING



WARPAGE OR DISTORTION HERE CAN CAUSE  
NOT ONLY EXHAUST VALVE TO BE HELD PARTIALLY  
OPEN AT "X" BUT INTAKE VALVE AT "Y" ALSO.

# Facing Facts on V

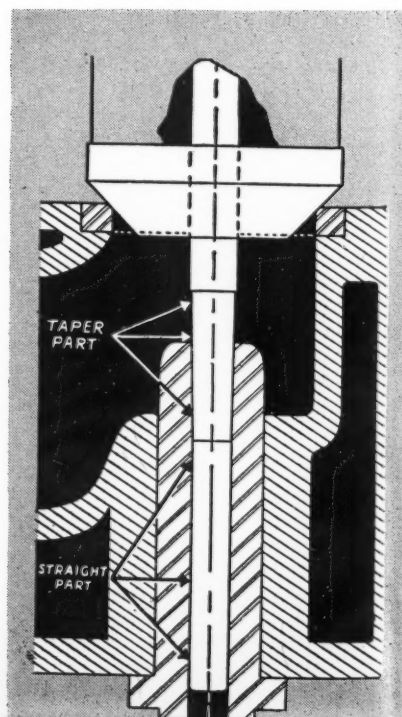
IT was our good fortune not so long ago to land in the town of Sioux City, Iowa, where the name Sious, to the automotive-minded men at least, is synonymous with valves and valve jobs.

To be more specific, Albertson & Company, who have made valve-servicing equipment for long time; who produced hardened valve rings for the trade many years ago (when many said it couldn't be done because the seats never would stay put), and who have had about as much to do with valves as any one, are located in Sioux City.

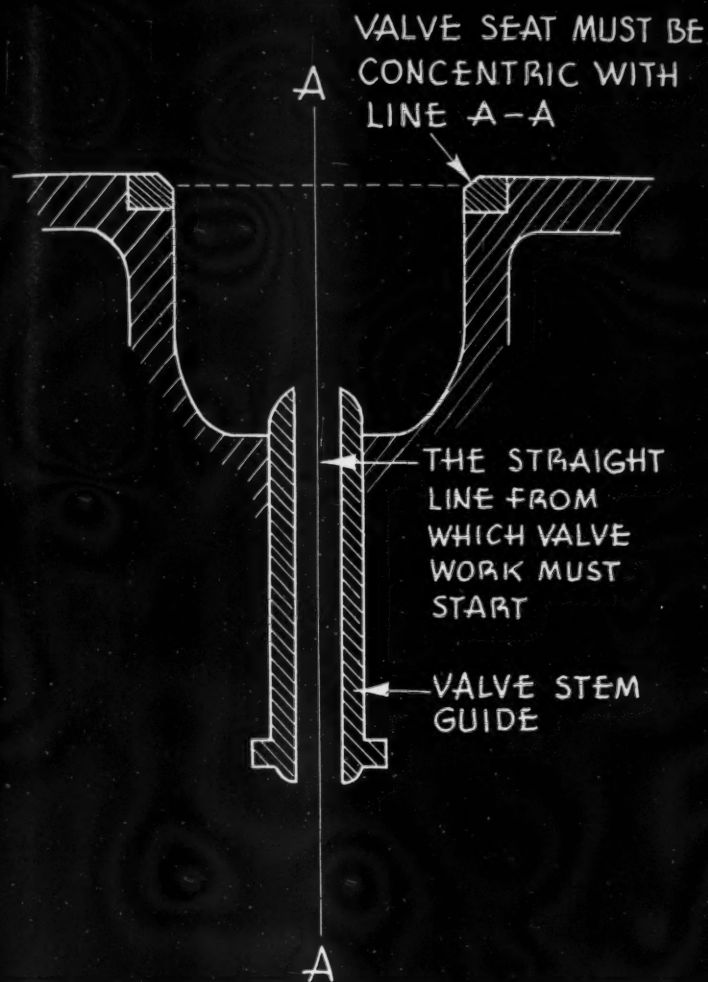
One would almost be ready to say that in this day and age just about all has been said and written about valves and valve service work that could be written. But things move fast in this industry, and only

when you talk awhile with a manufacturer like Albertson do you realize that yesterday was yesterday, today is today and tomorrow will be tomorrow. The only permanent thing is the change that constantly takes place.

Every now and then something comes along which looks like the apple cart of convention is going to be kicked over, and service men wonder what they will do about it. Most readers will probably recall some years ago, when the hardened valve seat came into being, that "valve-grinding jobs would be out from then on." All the valve equipment would have to be junked and one more profitable service job would be taken away from the already dwindling list of shop operations. But things didn't go that way.







(Upper left) These diagrams naturally are exaggerated in order to show distortion of the block, or head causing valves to seat properly.

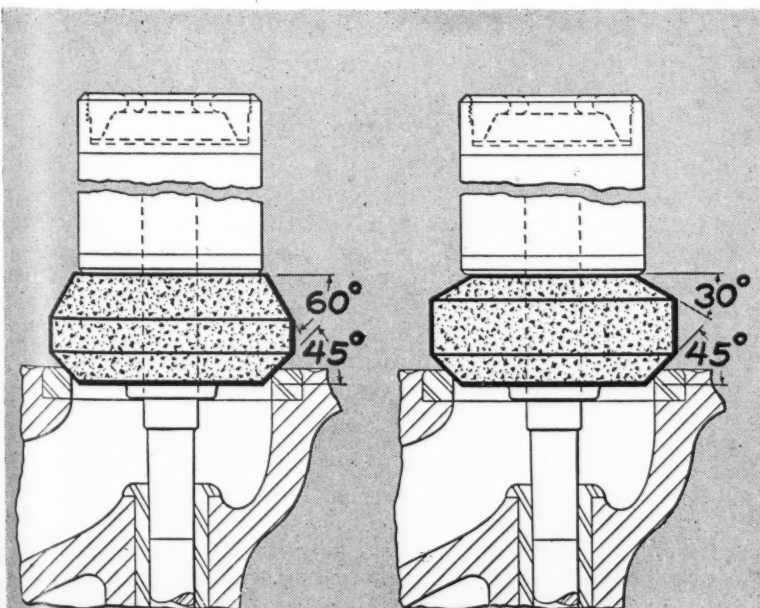
(Upper right) Since engine valves were made with the head concentric to the stem it naturally follows that the line A-A must pass directly through the center of the valve seat.

(Lower left) By selecting the largest Sioux tapered pilot which will enter the valve guide, the straight part aligns the pilot correctly with the center line of the valve guide. Accuracy is thus assured.

(Lower right) Sioux grinding wheels come either 45 deg. or 30 deg. The regular 45 deg. wheel can be turned over and dressed to 30 or 60 deg. on the dressing wheel.

# Valves

**Albertson & Company has kept pace  
with a fast moving industry**



It's very true that the hardened valve ring or seat did prolong the life of valves, but along with the hardened seat came other engine developments. Higher compression ratios, greater speeds and more constant running at full load contributed to shortening the useful life of seats machined directly in the block. The exhaust valve being subjected to high temperatures, had formed upon it and its seat an extremely hard substance. It is not unusual for an engine to run at 4000 r.p.m. these days, which imposes many more hardships on the valve mechanism. These developments caused service men to haul out their valve equipment again, dust it off and go back to work. The work was not the same as before because, as every service man knows, you cannot use valve reamers or cutters on hardened seats. It meant different kind of equipment and different methods.

We found out many things about valves and valve work at the Albertson plant. These things the service man must know, not only to round out his own knowledge of valves, but to properly sell his customers on the need for modern valve service work.

When hardened valve seats made their first appearance in passenger cars many makers practically told the purchasers of such cars they could forget the customary "valve grinding job," at least for 25,000 miles or so. Many car owners accepted this advancement and even tune-up men did everything else to make engines run right except that they didn't give the valves a thought. True, valve materials are

*(Continued on page 64)*



# Twenty Ring Jobs per

**—is good business in any shop, but the Gray brothers add 180 tune-ups, 20 brake relines and 25 valve jobs**

"WHY sell a carbon and valve job only, when rings are needed also?" is a slogan of Gray's Motor Service in Salt Lake City. "He profits most who serves best" is a slogan of the Rotarians—and the application of these mottoes can best explain why Gray's has grown from a tiny wooden shack to the most up-to-date plant of its kind in the intermountain west.

Before going into the technical reasons for the success of the four Gray brothers, Bill, Clarence, Walter and Elmer, a brief history of their struggle to make good makes a fitting introduction. As Shakespeare said, "thereby hangs a tale," so on with the story.

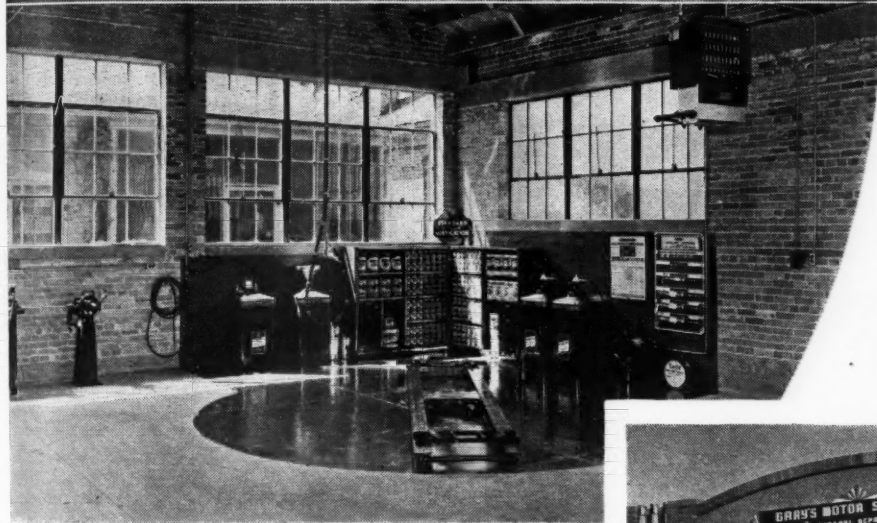
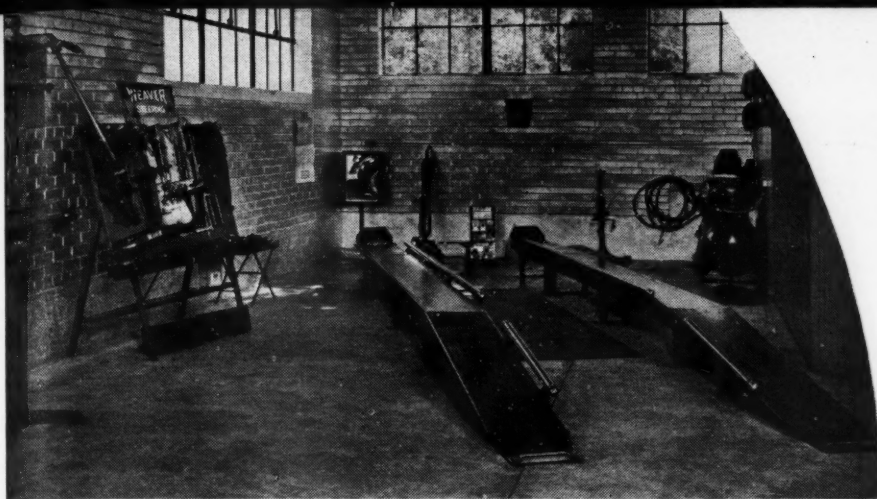
In this case it was the younger brothers, Walter and Elmer who first started the shop, while their older brothers, Bill and Clarence

were working elsewhere. With no capital, except brains and hands, they built a shop out of dry goods boxes with room for two cars. They rented the land on which to build this shack for \$60 a year. They borrowed \$1,000 to get tools.

When one thinks this was only a little over 12 years ago, what follows reads like a fairy story. Business was so good that the shack was soon too small and with the money borrowed, a sheet iron building was erected. The two older brothers came into the firm and later the four took shifts in giving the finest service possible with the slogan, "the customer is always right," being lived up to. They could not afford to advertise in those days

and their customers were their best advertising. They stood back of what they said 100 per cent and believed it was better to put a little extra into a job than have arguments. The reason for the location on the west side of town was that no shop of this kind was located there although today three fourths of their business comes from the wealthier part of the city. Business continued to flourish and a new location was sought. The boys bought a corner lot one block south from their first location and located permanently at 404 North Second West. They built a modern one-story steel roofed building and instead of \$4,200 in equipment today their machinery and tools alone





(Left page)—Shop tool department of Gray's Motor Service showing how many of the tools are kept under glass. (Right page, top)—Front end of machine shop. Walls are aluminum painted for brightness. (Center)—Inside grease rack. (Lower)—Exterior of Gray's shop and recently purchased service truck.

By  
**HAROLD H. JENSON**



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are worth \$25,000. This building was even inadequate and in February, 1937, another brick addition was added. Customers now come from all over the West. Many from California vacation here while their cars are being overhauled. There are 20 men employed and night and day service is found. One employee, Harold Evans, has been with them from the start.

Last May, this year, was their largest in point of business with January, February and March way ahead of last year. Even during depression they carried on, completing additions to the plant in 1930 and only once had it been necessary to lay off men, for two months only.

In summing up reasons for their success, Elmer Gray wrote the following for MOTOR AGE: "We find the motoring public more concerned with results than anything else when they bring cars into the shop for service. With this thought in

mind we definitely built our motor work to a standard rather than a price. Invariably we find on a job something has to be used in addition to what has already been sold to make the car perform properly. To deliberately pass it up one not only jeopardizes the proper functioning of the motor, but a needed profit on parts as well.

"As an illustration how many garagemen pass up the sale of spark plugs? In Salt Lake, Gray's sell more plugs than any two dealers or independent shops combined. We do not do this just to be selling plugs, but we do know with a bad set of spark plugs all the careful tuning in the world will not make the car perform as it should. The

same story belongs to ignition parts of all sorts, wires, cables, points, condensers, rotors and cups. Carburetor jet change-overs for this altitude, the proper calibration of carburetors regardless of altitude; all these things should be carefully checked. Too often the complaints of car owners having unsatisfactory work done elsewhere are not due to poor workmanship but poor salesmanship, in not selling the owner what was actually needed to make the car perform properly.

"The same applies to motor overhauls. Why sell a car owner a valve job when he needs rings just as badly? Why sell just rings when piston expanders are needed,

(Continued on page 50)



(Top Left) The class room used at the Carter Service School for the first week's instruction in fundamentals.

(Center left) Here, during the second week of the course, the student mechanics work on actual carburetor servicing.

(Lower left) Engine tune-up work and the relationship between ignition, cooling, valve action, etc., and carburetion is a major part of the third week's schooling. All of the class rooms are air conditioned.

# Carter School Makes

by

**BEN IKERT**



IT is pretty well known by all service men, especially those doing engine tune-up work, that such things as spark plugs, ignition timing, valves, etc., and not the carburetor, are responsible in most cases for lack of economy and engine performance.

In the old days engines could be made to hum healthily by going after the spark plugs, the ignition timing, fixing up a few loose connections, and so on.

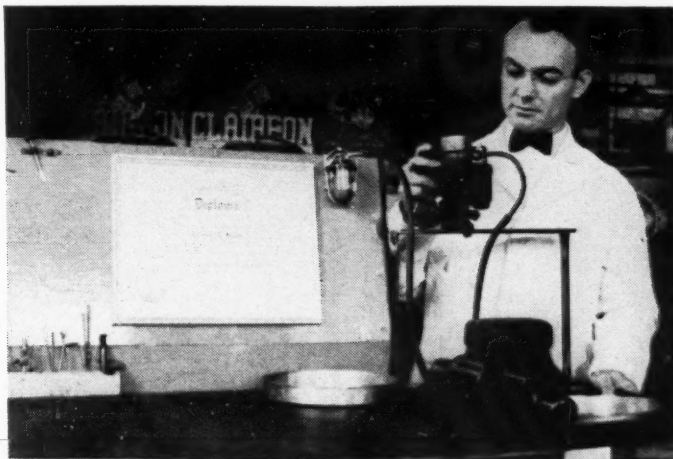
Likewise, today many instances of rough engine performance, poor mileage complaints, and so on, can be "licked" by the service man who knows his carburetion, but at the same time where to look for troubles when carburetion is not to blame.

Of course, in the old days Carter carburetors had no such things as accelerating pumps, climatic controls, anti-percolating devices, and such items. They performed very good with the fuels available. Many had adjustable jets or controls of the incoming air, so that compensations could be made for other not-so-well functioning parts of the engine.

Tune-up was so important a fac-

MOTOR AGE, September, 1938





LaVerne Swain, graduate of Elgin, Ill., shows the apparatus he has constructed to enable him to render carburetor service quickly and efficiently. His certificate of graduation from the Carter school is prominently displayed for the benefit of customers.

# Carburetor Experts

**Here's where mechanics get  
an overhaul and tune-up.**

tor that Carter decided to emphasize this class of work. A small field organization was started and has been increased steadily over a period of years.

This field organization helps in every form of Carter service. The men work with distributors, service stations, jobbers, dealers, and fleet operators. This work consists of educational meetings and clinics. All of this is done as a matter of education along, of course, with the more obvious reason—to carry on efficiently the servicing of Carter carburetors.

The larger cities in general were better fixed as regards available and competent mechanics. Service stations were better equipped to render carburetor service, and car owners, as a class, could be better taken care of than in the smaller communities and rural sections. But, unfortunately, "carburetor troubles" or any kind of motor car troubles play no favorites when it comes to geographical location, and the car owner "in the sticks" needs precisely the same kind of service as his brother car owner is accustomed to in the large metropolitan areas.

The problem, then, was to get men who know their carburetion established in the small town or cross-roads service stations. Men who could fix a Carter carburetor when it needed fixing so that the company had assurance its product was brought back to factory standards.

Naturally when the car owner in the smaller community has carburetor trouble it might be, and often is, something entirely different. It might be ignition or valves, but supposing the hometown mechanic dives into the carburetor with little or no knowledge of the unit? That's what they did, and still do, in some places.

Along about 1934 the Carter Corporation concluded that a school conducted and controlled by the factory would be of assistance to the trade. It is not a school open to more or less everyone. Nor is there an admission fee. It was decided, too, that there would be no language spoken over the heads of the students by the faculty members. The course is practical in every respect. The objective was to give the student who naturally would be called upon to do the work

of servicing carburetors when he got back to his home town, guidance in the actual service work he would encounter.

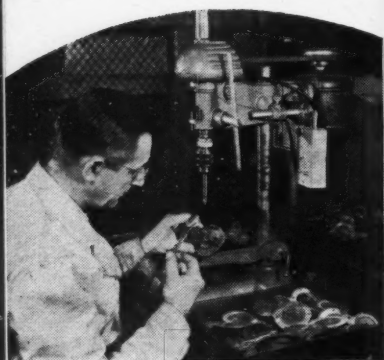
Today, Carter is happy when they see students from the small towns and communities. It means that the large map which hangs in the Carter offices with the various colored push pins in it (each pin shows the town from which a student comes) is getting more and more conspicuously spotted in those regions where distances are vast and where the car owner doesn't like to get stuck with engine trouble.

But, some one may ask, "if the student at the Carter School gets all carburetor training, what good does it do the car owner who has been let down with trouble that may not be carburetor at all?" A fair question.

Long ago the company realized that the carburetor it was building is a good instrument and will function at its best when the related items of the engine allow it to do so.

Compression, ignition, carburetion—there, generally speaking, are the three basic "musts" of the engine performance. They are the

*(Continued on page 62)*



(Above) General view of AC fuel pump rebuilding plant at Detroit. Rebuilding plants are located in 20 other cities. (Upper left) Inspecting valve seats with magnifying glass. All seats are either refaced or replaced. (Lower left) Diaphragm assembling operation is performed along exacting factory practices.

# New Pumps for Old

— with AC's exchange plan for ailing units



Pump parts are cleaned thoroughly in a boiling cleaning solution, and then put through the high temperature rinsing tank.

**A**FTER a year's operation in the service field, the Fuel Pump Exchange Plan is pronounced an important success.

A sturdy device, freer from trouble than most automotive parts, the fuel pump, with some 30 millions in use, has created an important service activity.

Although the manufacturer had provided authorized fuel pump service stations at strategic points, servicing of this highly important unit, outside of these authorized stations, was more or less haphazard, and there was need for better control over the quality and precision of the work.

With the service field confronted with this situation, the fuel pump manufacturer, the AC Spark Plug division of General Motors, immediately recognized that establishment of an expanded authorized fuel pump service system was at once imperative in order to properly serve the public, the dealers

and the entire industry generally.

So AC embarked upon a new service activity by establishing fuel pump rebuilding plants in 21 cities throughout the country, and inaugurating a "fuel pump exchange" plan. This was one year ago.

Now, after a year's experience with the new plan, nothing but praise has been heaped upon the venture by dealers and repairmen generally.

The new plan is very simple. The dealer replaces an ailing pump with a new one taken from his stock. He then sends the old pump to his wholesaler and in exchange receives a factory rebuilt unit neatly packaged. The wholesaler then sends the ailing pump, received from the dealer, to the authorized AC rebuilding plant, where it is put in first-class condition again, placed in a new, sealed package and returned to the wholesaler.

The AC fuel pump exchange plan.  
(Continued on page 60)





## THE READERS' CLEARING HOUSE

*of*

# Service Men's Queries

### NO PEP

Have customer who is having a lot of trouble with a 1937 Chevrolet truck 1½ ton. This truck had a valve job and general check-up at a very early mileage, but gradually got worse. At 16,000 miles, service man checked again and advised valve, ring job and general check-up; new carburetor was also put on. This truck is not much better—seems to run O. K. until you get it on the road and when you strike a grade or begin to step on gas it just seems to be sluggish and will not step out as it should.

This customer has another 1937 truck with 40,000 miles and it runs O. K. and does not use any oil; the

truck in question uses too much oil.

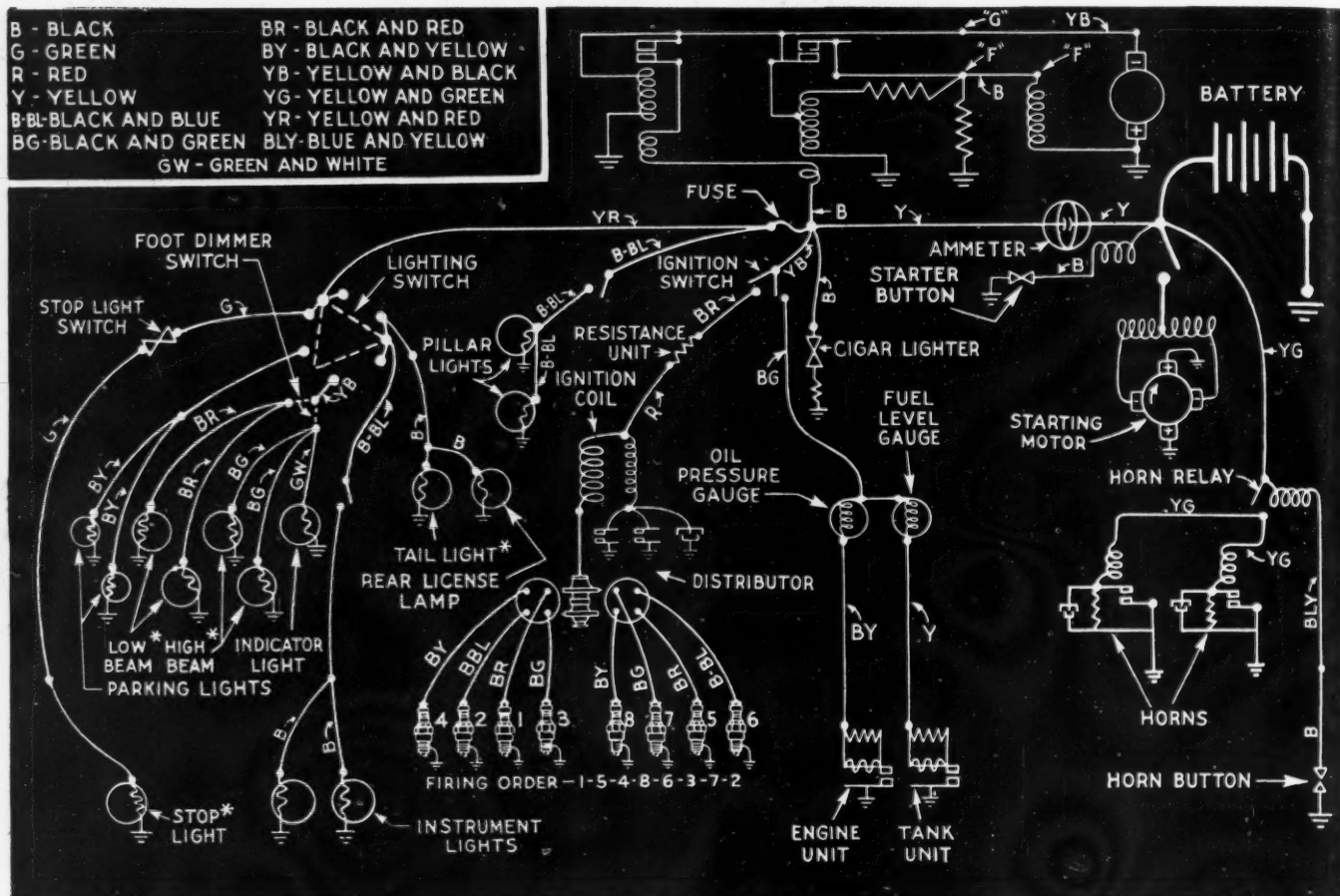
Can you give me some light on this?  
C. B. Norris, Marrowbone Garage,  
Marrowbone, Ky.

**Y**OU apparently have quite a problem with that 1937 Chevrolet 1½ ton truck.

The first thing I would do would be to check the valve timing. I would disregard the timing punch marks on the camshaft gear and crankshaft gear and I would set the valves in the following manner. Set No. 1 intake valve at .010 inch clearance cold and then turn the engine over slowly by hand. Insert a .004 inch feeler gage on No. 1 valve stem so that you can easily

(Continued on next page)

**BILL TOBOLDT, Editor of MOTOR AGE, conducts the Readers' Clearing House. He presents some of the thousands of questions asked by readers of MOTOR AGE together with a practical analysis of the difficulties in his replies. You, too, are cordially invited to send us your problems.**



1938 Ford V-8 Wiring Diagram

tell when the rocker arm makes contact. You will understand that this is the equivalent of having .006 inch clearance, namely the .010 inch originally adjusted minus the .004 inch feeler gage which you are using to detect the opening point. At the time the .006 inch clearance is taken up and the valve is ready to open, the flywheel should indicate that it is  $3\frac{1}{4}$  flywheel teeth before top center position. If the flywheel is not marked for top center position, it will be necessary for you to do this, marking the tooth that indicates top center of No. 1 piston. It will then be easy for you to determine  $3\frac{1}{4}$  flywheel teeth before the top center tooth. If the



"It's O. K., pal, just write to Motor Age Clearing House and everything will be jake!"

flywheel is not  $3\frac{1}{4}$  teeth before top center when the valve starts to open it will be necessary for you to change the mesh of the timing gears to give this valve opening position. It is quite possible that this trouble is caused by late valve timing and I suggest that you make this check first in the manner described above.

The next thing I would do would be to set the ignition timing and again I would disregard the ignition timing mark and set it in the following manner: Jack up the rear wheels and put the transmission in high gear. Remove three spark plug wires so that the engine is running on three cylinders. Start the engine and speed it up to about 30 m.p.h. Then, by using the speedometer as a tachometer, shift the distributor until you reach the point of maximum miles per hour. Lock the distributor in this position.

By using these methods of setting valve and ignition timing you eliminate the possibility of error which may have occurred at the factory in marking the flywheel and the timing gear.

Having completed these operations, I would next check the heat control valve in the manifold. I have seen quite a few cases in which this valve has become stuck in a closed position so that the exhaust was constantly directed around the heat chamber of the intake manifold. This naturally interferes with the free passage of the exhaust out through the muffler

and sets up a back pressure which results in reduced speed. This valve is controlled by a thermostatic spring which is connected to the shaft, one end of the spring being attached to a pin in the manifold. It is very important that this spring be wound up to the proper tension. I would first disconnect the spring from the pin and be sure that the valve shaft is free so that there is no possibility of its sticking. Then wind up the spring just enough to slip the end over the pin in the manifold. This will be approximately  $\frac{1}{2}$  turn tight from the free spring position.

The next point to check would be the muffler to be sure that it is free and if there is any doubt, I would suggest that you replace it with a new one.

If these conditions do not improve the performance of the job, then I would proceed to clean and gap the distributor points and spark plugs. The spark plugs on this job should have a gap between .032 inch and .035 inch. The distributor points are set at .018 inch. Set the octane selector at zero on the scale which should be the approximate position for average gasoline.

These points should be of assistance to you in clearing up this trouble.

**THANKS, FELLOWS!**

**I**N the July issue, on page 25 of the Readers Clearing House, I answered a query from Harry Grant of



Ludington, Mich., under the heading of "Self Stopper."

Judging from the number of letters I have received from you fellows, it appears that I guessed at all the answers except the right one. So, Harry, I am passing along to you the diagnosis sent in by fellows who have had a similar trouble and have found the cause—they all agree that the most likely cause of this trouble is that the air vent hole in the gas tank cap is plugged, preventing air from entering the tank which, of course, would interfere with the flow of gas to the carburetor.

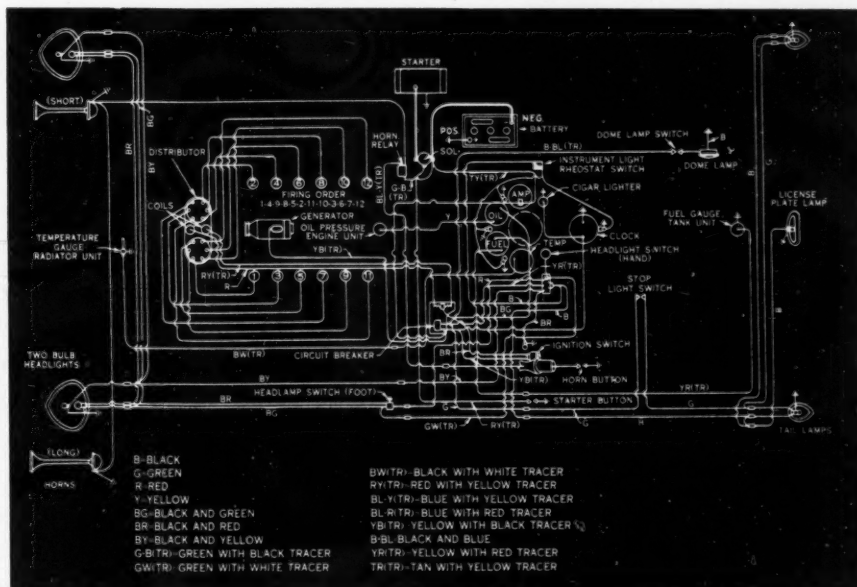
## PLYMOUTH TIMING

Your occasional help in connection with other cars in the past was very welcome and always useful. Just now I wish to ask a question or two regarding the ignition timing system on the Plymouth Roadking engine, as I don't quite understand it. Is its so-called calibrated ignition any different in principle from the vacuum advance as used in the Chevrolet and Ford, and is it true there can be no "ping" from the Plymouth engine? I doubt it. Is any provision made, as in Ford and Chevrolet, for a change in spark timing in this Plymouth engine to accord with different grades of gasoline? In what way is the spark timing changed for any reason that might develop? As you know, the Chevrolet has an octane selector and the Ford two devices, but what has the Plymouth and where is it? Thanks a lot. J. F. Roberts, Lock Box 11, Richfield Springs, N. Y.

THIS high-sounding name is in effect no different from the conventional vacuum advance used on other cars. It operates exactly in the same manner and the spark timing is changed by simply shifting the distributor in the conventional manner. It has been found true in the case of the Roadking as well as with other engines that after setting the ignition timing on the floor that it is possible to advance the timing a little bit on a road-test, provided a good grade of gasoline is used and the engine does not knock. Of course, the vacuum advance will not prevent the usual spark knock in an engine if the timing is improperly set or an inferior grade of gasoline is used.

So, in effect, the process of setting ignition timing on the Roadking is simply to set the distributor at the ignition point and then, if a road test justifies, advance the distributor to the point of maximum performance. I understand that the term—calibrated ignition—is intended to imply that the carburetor was carefully calibrated to take care of a vacuum advance which is nothing more or less than the same procedure which is supposed to be followed by all good car manufacturers.

MOTOR AGE, September, 1938



1938 Lincoln-Zephyr Wiring Diagram

## DRILL GUIDE

Here's a picture of a drill guide which I use to prevent marring the sides of piston grooves when drilling oil holes. It is made from a piece of old piston ring about 2 in. long, drilled in center of the ring face.



I find this guide especially useful in drilling  $\frac{1}{8}$ -in. grooves when you do not have a drill stand and V-block to use. I hope you'll find this shop kink worthy of publication.

Stanley Gilbert, South Work Street Garage, Falconer, N. Y.

## POOR MILEAGE

I have taken MOTOR AGE for a good many years and am an ardent reader of The Reader's Clearing House. And now the time comes that I have a problem to solve.

I have a 1931 Model Oldsmobile from which I get a very low gas mileage. I now have the third carburetor on this car. Have followed factory specifications on each model carburetor.

The car came with a Stromberg, then I tried a Carter on it. The factory informed me that the car may need rings and to set the valves at 6 and 8. Now I have a Tillotson UR1 model on it and performance is the same on all models.

Understand, I have checked timing, points, plugs, compression and set valves before placing blame on carburetor each time.

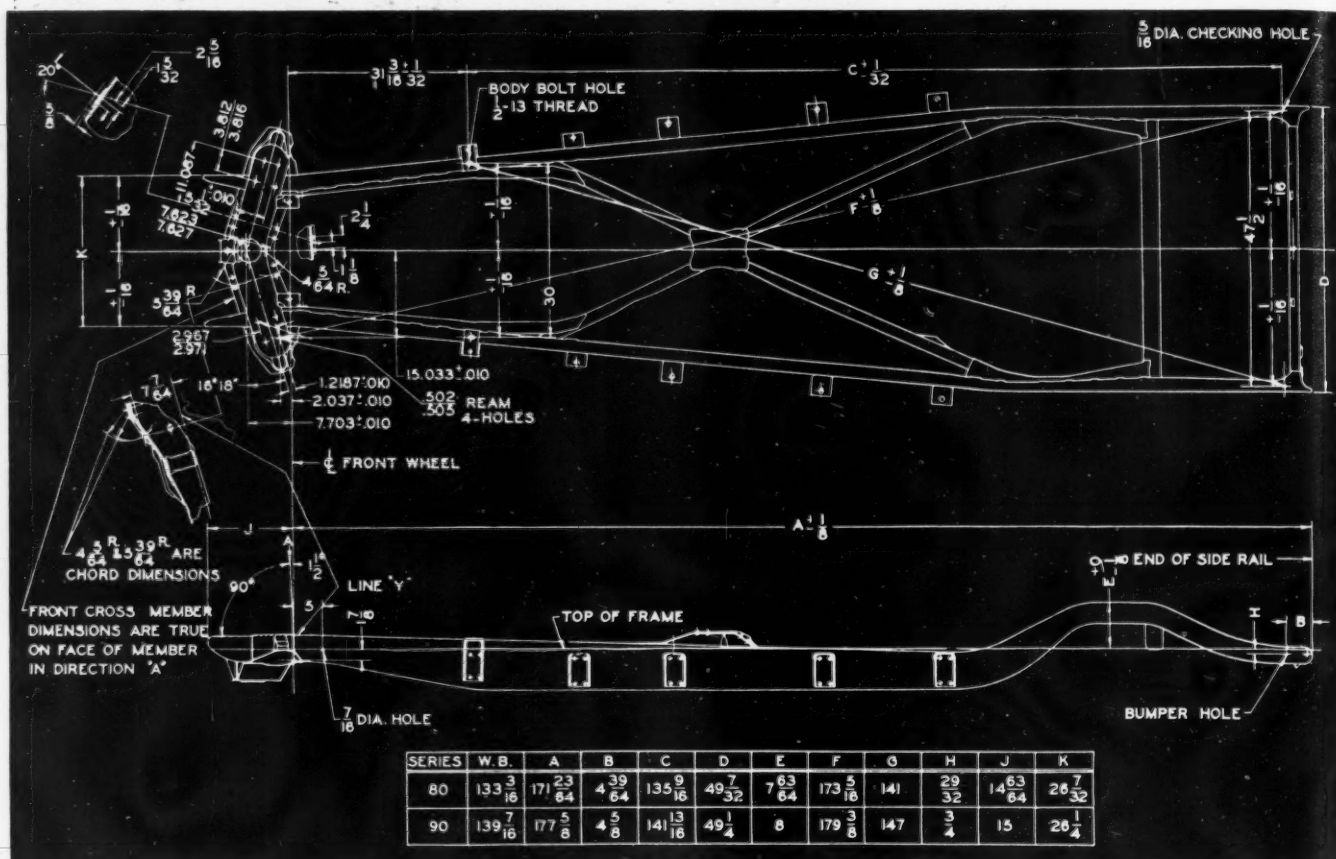
Could it be that on that model car there was something wrong with the intake manifold? Please advise procedure with present model of carburetor, if possible. Rae Craddock.

Craddock's Service, 48 Main Ave., Clinton, Iowa.

YOUR letter leaves me somewhat in the dark since you do not mention just what mileage the car is delivering at the present time. From personal experience with this model Oldsmobile, I am in a position to say that 14 to 15 miles per gallon is just about tops with the motor tuned up in proper condition. There are two points that you may have overlooked in checking this job, the first one being the heat control valve in the exhaust manifold. If this valve is stuck in a closed position, the gas mileage will be poor and the performance will also be poor. The second point is that of the muffler. If this muffler is more than a year old, I suggest that you replace it with a new one as I am sure that a muffler in poor condition will account for at least two miles per gallon loss in performance.

The work you have done would seem to eliminate the carburetor as being a source of trouble and if the points mentioned above do not clear up the trouble, I suggest that you make a compression test of this engine to see whether it needs new rings or new valves or just a valve and carbon job. A compression reading of each cylinder should show 77 lb. pressure at cranking speed and if it does not, it is a pretty good indication that either the rings or valves are in poor condition. If the compression pressure is low, put about a tablespoonful of cylinder oil through the spark plug holes of each cylinder and then take another reading after turning the engine over a few times to get the oil working into the rings. If the compression reading is higher than the first reading, it is an indication that there is a leak past the rings. If the addition of the oil

(Continued on next page)



Frame Dimension—Series 80-90  
1938 Buick

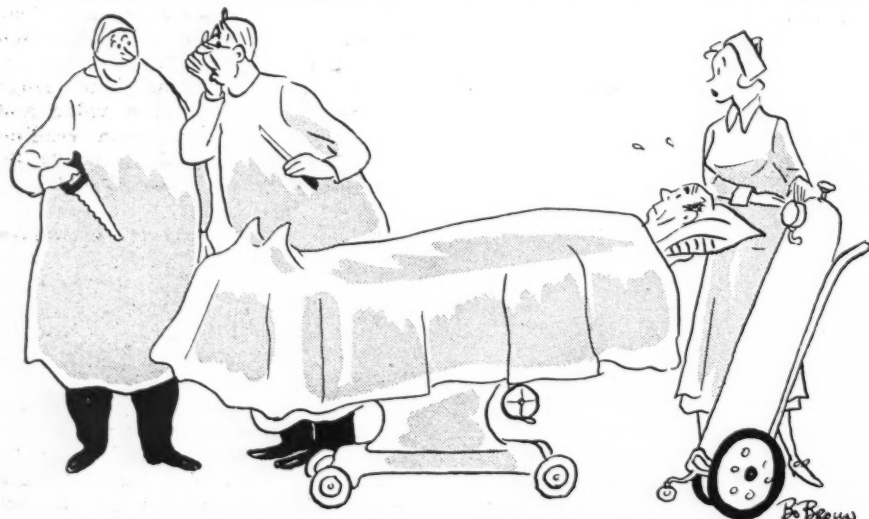
makes no difference in the reading, then it is an indication that the valves are faulty.

Here's another suggestion. Look up the March issue of *MOTOR AGE* and time this engine according to the method explained in the story "Performance Requires Perfect Timing." I believe you will find this to be a very efficient method of setting ignition timing for maximum performance.

Also be sure to check the automatic advance unit.

## SECONDS THE MOTION

A few lines from an old timer in the business, since 1906. I second the



"Has our answer come from 'Clearing House' yet?"

motion of the reader who suggests a review of all announcements since 1908 (or earlier) and would prize such a book very much.

Regarding the Buick of John Shopp of Newcastle, Ind., how about a small air leak at one of the intake manifold gaskets at the block, or a heat-riser tube just beginning to burn through. Also, a motor will idle slower and smoother with wide spark plug gaps.

On the Wolverine which only starts by cranking, have always found the trouble to be one of two things, i.e., spark plug points much too wide or a loose connection in the ignition

wires between the take-off (usually at the starter switch) and the points.

I read so much about hydraulic brakes grabbing, so here is a tip. If the lining is not grease-soaked or springs not broken on the brake that is grabbing, the trouble is in the opposite wheel on the same axle, merely gummed and stuck pistons in wheel brake cylinder. I've had them stuck so tight that they had to be driven out with a drift.

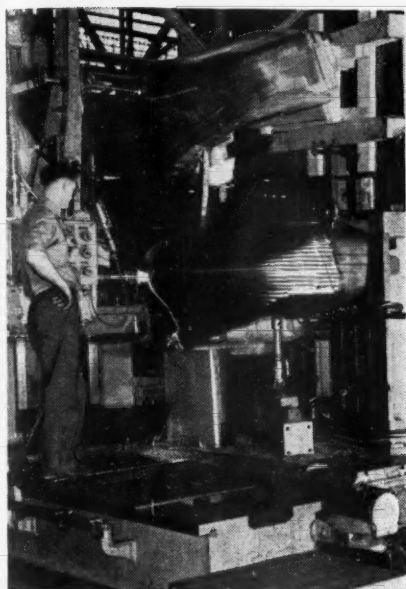
Your diagnosis of the "hanging on" of the brakes of M. Whalen of North Dakota is quite correct, I believe. It is a common trouble at my place, as I take care of a string of Plymouth taxis.

Ralph McCune, 919 W. Fourth St., Santa Ana, Calif.

## FUEL LEVEL GAGE

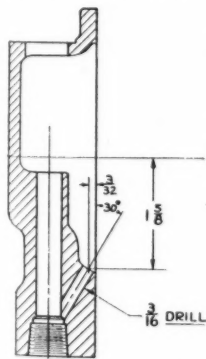
To make an adjustable carburetor fuel level gage, secure 1/4-in. square piece of stock 4 in. long. In the center drill a No. 21 hole and tap with 10/32 tap. Then secure a 10/32 machine screw 1 in. long with a lock nut. To enable you to count the number of turns when adjusting the screw, flatten one side of the screw head. The end of the screw should be just flush with the lower edge of the keyway stock when the slot and flat side of the screw edge line up with the cross marked on the top of the keyway stock. Each half turn of the screw represents 1/64 in. Stanley Gilbert, South Work Street Garage, Falconer, N. Y.





Cutting a front fender die on an automatic Keller die-cutting machine in the die department of Pontiac Motors. The wood model which is being followed as the pattern is mounted near the top, while the solid die casting made of chrome nickel iron for hardness is shown below. This die has had a rough cut. Approximately seven days are required to cut a fender die. They are accurate to 1/16th inch and then require about ten days to be finished by hand. If dies like these were made by hand it would require approximately ten times as long to do the entire job, which would make the modern car with its sweeping fenders and streamlining an impossibility because of time and cost.

#### Drilling Relief Hole For Proper Operation of Vacuum Control



performing this operation.

#### Rear Main Bearing

When oil leakage at the rear main bearing is encountered on Chevrolet trucks unloading at grain elevators, we suggest using only four quarts of oil in the crankcase. The trucks should not be run with the oil below the low mark on the oil stick.

The leakage occurs when trucks are raised at the front end to dump the grain and the truck passes through or remains at an angle just before the ball rolls back to close the drain hole in the rear main bearing.

# Service Hints

## from

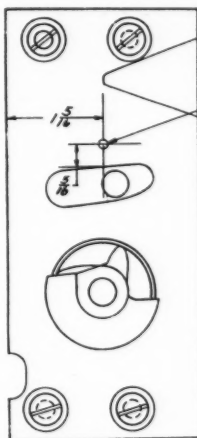
# The Factories

#### Front Suspension Package—1937-1938

In order to reduce the ultimate cost to the owner and to simplify the ordering of parts needed to replace worn front suspension parts of the 1937-1938 Pontiac models, a new service parts package has been released. This is part 502,520, Front Suspension Arms and Bushing Set Package, dealer net \$9, list price \$15. These packages are now in stock at all GMPD Master Warehouses.

The 1938 type parts are used in making up the package. The lower control arms and pivot shaft are assembled to the spring seat and can be installed in much less time than the individual parts.

#### Door Rotary Locks Sticking



In the event a sticking condition develops in the door locks on

1938 Studebaker cars the following procedure should provide a correction:

1—Sometimes the sticking of the door locks is the result of pressure applied against the lock by the rubber weather seal

around the doors. In many cases the sticking locks can be corrected by setting the striker out to relieve some of the door pressure against the lock. 2—Powdered graphite on the rotary door lock cams will prevent sticking and give easier operation of the handle. This powdered graphite can be installed by drilling a 1/8-in. hole through the lock face as shown in the accompanying illustration. This operation can be very easily performed with the use of a No. 3 Graph-Air gun.

3—Check the door and if it is found to be without lubricant, remove the lock and pack it with vaseline.

#### Chevrolet Torque Tube Vent Cap

To prevent any rattle of the rear axle torque tube vent cap on 1937 Chevrolet cars, squeeze the cap with a pair of pliers to put friction between the vent and the vent cover.

When this is being done care must be exercised so that the vent is not entirely closed as the venting of the rear axle is essential for satisfactory operation.

#### Studebaker Clutch

The design of the semi-centrifugal Studebaker President 4C clutch is such that the pressure plate assembly should be serviced only as an assembly. The release lever adjustments are difficult to reach in service and the counter-weighted levers are mounted on small roller bearings which would considerably complicate their assembly in the field. The clutch pressure plate is available under part No. 192-201.

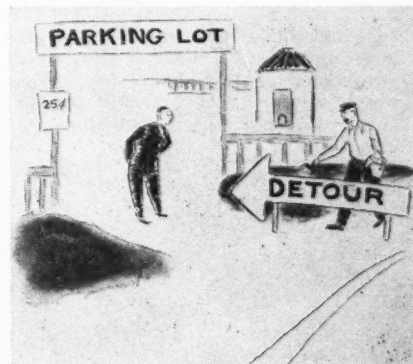
#### Metering Rod Hole Cover

When installing the Bakelite Metering Rod Hole Cover, Chevrolet Part No. 838,896, the throttle should be opened and closed several times to make sure that the Bakelite Cover does not ride up and down with the metering rod. When making the above installation the brass Metering Rod Hole Cover must be removed.

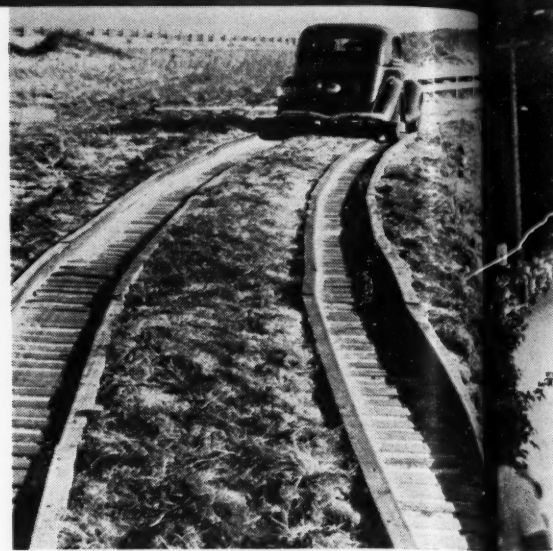
#### Transmission Slipping Out of Second Speed Gear—1936 and 1937 Dictator Models (3A, 4A, 5A, and 6A)

In the event slipping out of second speed gear is encountered with the transmission on the 1936 or 1937 model Studebaker Dictator cars, installation of a new transmission main shaft and second speed gear assembly should correct the condition.

Properly fitted and matched shaft and gear assemblies are available through Studebaker Parts Depots.



"This ought to bring us some business!"



**Dunes** hold no terror for motorists crossing the shifting sands of Cape Hatteras. This ingenious track prevents their being stuck in the sands.

**Winner** of Chevrolet's "soap box" derby this year was Robert Berger, 14, of Omaha. Shown here just after he crossed the finish line.

## Bustling at Bonneville Salt Bed

With Captain George Eyston's world land speed record assault delayed more than a month, every indication pointed to a late-fall scramble at Bonneville Salt Bed for the fastest speeds man ever has attained on land.

A wet surface of the 13½-mile course laid out on the spacious salt flats in northwestern Utah thwarted any attempt at a clocked speed until August 24—and then Eyston's estimated gait of 347.155 miles per hour was "cheated" of record listing when the electric eye of the timing device failed to function.

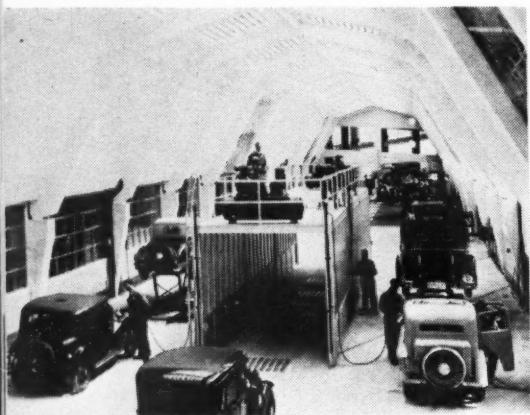
Eyston originally planned to make his first attempt on July 18 and arrived at Bonneville from England days in advance of that date in the hope of boosting his own mark of 311.42 miles per hour before his competitor, John Cobb, arrived from England.

Eyston said the light refraction from the blazing morning sun kept his "Thunderbolt" from cutting the electric beam which operates the timing device at the end of the measured record mile. He was clocked officially

on the outward run (two runs in opposite directions are necessary) and his time was computed at 10.37 seconds for the mile, an average of 347.74 miles per hour. It was on the return trip that the electric eye failed. When officials admitted that Eyston traveled faster on the return trip, statisticians figured he approached 355 miles per hour.

However, the International Association of Recognized Automobile Clubs, represented in the United States by the American Automobile Association, will not recognize a record unless it is clocked in both directions by the electric timing device. So Eyston made another and more successful attempt on Aug. 27. This time he hit 347.49 m.p.h. on the outward trip and 343.51 m.p.h. on the return jaunt—thus breaking his old record and setting a new official record of 345.49 m.p.h. for the mile mark.

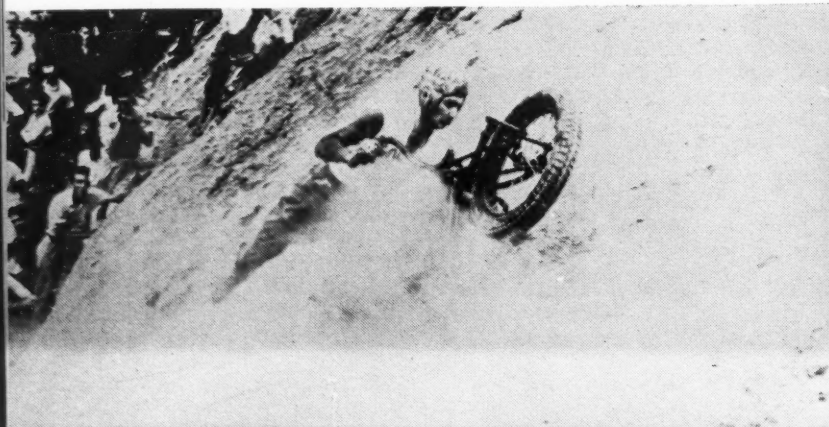
When Eyston completes his official trial, John Cobb was scheduled to make an official test in hope of being  
(Continued on page 74)



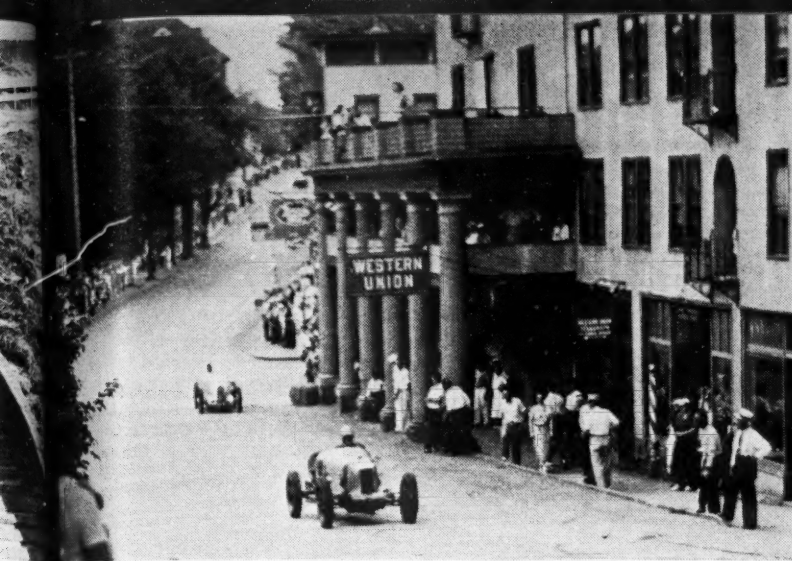
**Canal City** is Venice, Italy, with only 150 yards of actual roadway. Yet it has just completed this modern garage accommodating 2500 cars!—For tourists who come to town, of course. Shown above is a general view and a view of the main service quarters.

**Tough Going** for Ted Hychee in the 248-foot motorcycle hill climb held at Peninsula, Ohio. Ted is shown as he started his downward skid.

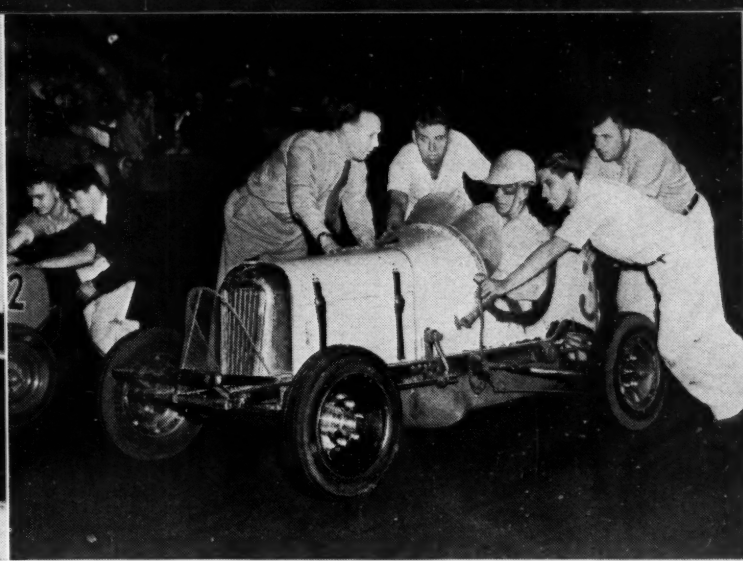
**Workers' Car** for the German people which is said to be going into mass production soon. It is reported that it will sell for about \$300.







**Road Races** are unusual in this country. However, the one shown here is an annual event at Alexandria Bay, N. Y. The winner was Miles Collier, who circled the 75-mile, 50-lap course at an average speed of 56.2 m.p.h.



**"Garson Night"** was held at the Freeport, L. I., midget track to honor "Texas Joe" Garson for his high point standing. He is shown here in his white \$4,000 Offenhauser.

## New Light Diesel Engine Announced

The announcement that the Northill Co. will produce automotive models of the Covic Diesel engine brings to the automotive industry a new size of power plant, so far as the American automotive industry is concerned. It is a 15-18 hp. engine designed for installation in such vehicles as laundry delivery trucks, milk wagons, city delivery trucks, and scores of other intra-city trucks.

As stated by Mr. Northrop, this engine is already in wide automotive usage in England and other countries. The Northill Co. will offer it in bare engine form primarily for use by truck manufacturers, also in a complete automotive unit incorporating electric starting and a 4-speed transmission. Both will be sold for original installation in small cars and trucks, while the engine with transmission is intended basically for the replacement market.

It is claimed foreign vehicles powered with this engine average 65 to 70 miles to the gallon of fuel oil and consumption of lubricating oil is only one gallon every 2000 miles. Operat-

ing costs have been found to be under  $\frac{1}{8}$  c. per mile.

Of particular interest to repair shops and garages is the offering of the Covic Diesel in complete power units, generator sets, and compressor and generator sets. These units are to be offered as a means of cutting power, light, and air compressing costs.

Where conventional Diesel engines have been two to three times the weight of gasoline engines of comparable power, the Covic Diesel has the same relation of weight to power as present gasoline truck engines. The weight of the basic Covic engine is only 280 lb., including flywheel. This is the result of patented principles and design, plus the use of alloys.

The Covic Diesel is a four-cycle, valve-in-head type of engine. The engine has a bore of 3  $\frac{5}{32}$  in., stroke of 3  $\frac{15}{16}$  in., displacement of 61 cu. in. and is rated 15-18 hp.

Total weight of the bare engine, with hand cranking system and 60 lb. flywheel, is 280 lb. Weight of complete marine engine, with electric starter, is 550 lb.; of the automotive engine with four-speed transmission, electric starter and generator, 425 lb. Total width is 30 in., height, 19  $\frac{1}{2}$  in., length, 19 in.

## Billy Winn Killed In Race Car Crash

Billy Winn, of Detroit and Kansas City, rated among the nation's leading automobile race drivers, died Aug. 20 of injuries incurred when his car blew a tire and overturned on the fourth lap of the 100-mile race at the Illinois State Fair.

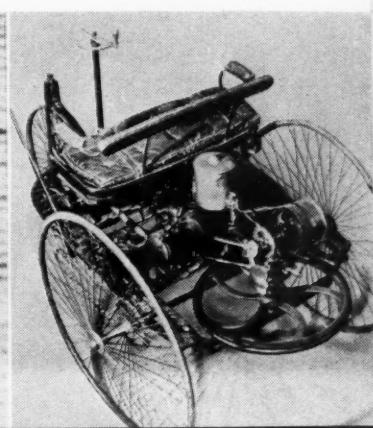
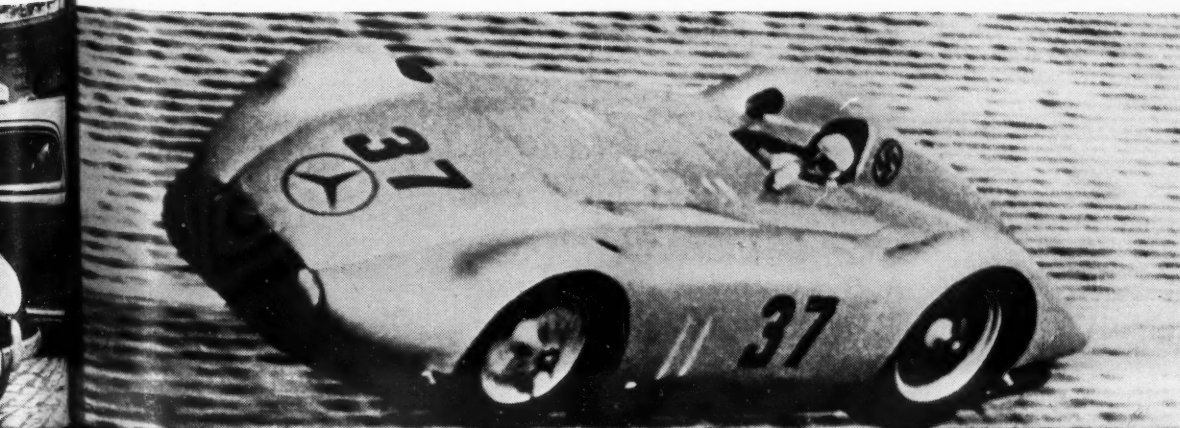
Winn was thrown clear of the car after it had turned over once, but suffered a fractured skull, broken ribs and internal injuries. He did not regain consciousness.

Although only 31 years old, Winn was a veteran of the dirt tracks, where he began his racing career and on which he had established many records. He participated in seven 500-mile classics at the Indianapolis Speedway. In 1935 he finished sixth in that race.

Winn was involved in several racing accidents, one of the most spectacular occurring at Indianapolis in 1933 while he was driving relief for Frank Brisco. One wheel came off while he was going 110 m.p.h., the car struck the inside wall and bounded into the air, but it came down with the driver unharmed.

**Newest** of the interesting race cars of the day is the latest product of the German Mercedes-Benz factory. Winners of all the 1937 International Races, these light, fast cars are familiar on the foreign speedways.

**Ancestor** of the ultra-modern car shown on the left is this first Benz automobile, patented in 1886. It had a one-cylinder engine of 0.75 hp., 250 r.p.m. The engine was cooled by a method of evaporation.



## Modified Plymouth Engine In New Tractor

A new farm tractor, developed by the Massey-Harris Co., Racine, Wis., and designated as the "Massey-Harris Model 101," has recently been introduced to the farm market.

Of particular interest to readers of *MOTOR AGE* is the fact that the engine used in this tractor is a modified six-cylinder Plymouth truck engine, supplied by the industrial engine division of Chrysler Corp., in Detroit. The engine has a bore of  $3\frac{1}{8}$  in., stroke of  $4\frac{3}{8}$  in.

Among the most important of the special features of the engine are the following: new manifolding of up-draft carburetion, heavy truck-type clutch, truck-type engine mountings and self-starter as standard equipment. The self-starter is considered a novelty in moderately priced tractors.

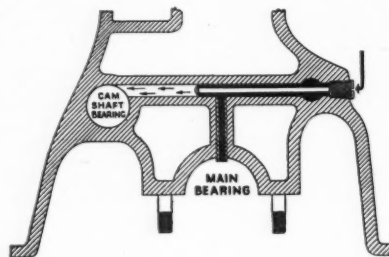
Another feature is the use of the standard Plymouth combustion chamber with 6.7 compression ratio head, burning gasoline fuel exclusively. The engine is completely sealed for the low speed dust laden operating conditions, incorporating a heavy-duty tractor type air cleaner and the standard Purolator oil filter with renewable cartridge.

Massey-Harris emphasizes the "twin power" feature of the tractor, achieved through unique automatic governor control built into the engine. Heart of the device is a centrifugal governor which controls engine speed for plowing at 1500 r.p.m. This is one range of power development. The other range is for belt work, this being done at an engine speed of 1800 r.p.m. The increase in controlled speed is automatically accomplished by a special mechanism which comes into play as the shift is made into belt drive. Simultaneously, the main transmission is cut out so that the higher engine speed is never available for ordinary running operation.

## Oil Pressure Regulator

An oil pressure regulator for Chrysler-made cars has been developed by the Thexton Mfg. Co., Inc., 313 Third Avenue, South, Minneapolis, Minn. It is designed to maintain the oil pressure at the main and connect-

ing rod bearings even though wear has taken place at the camshaft bearings which, without some regulation, would permit excess oil to escape at these points and reduce the pressure at the main and rod bearings. To in-



stall the Thexton oil pressure regulator, remove the plug at each main bearing as indicated by the arrow, and replace with the regulator. Adjust the oil pump to normal pressure before starting the engine. For complete information, sizes and prices, write the manufacturer.

## DeVilbiss Training School

The DeVilbiss Company announces the schedule of their training school for the last half of 1938. This school is open to industrial painters, master painters, automobile refinishers, and all others interested in learning the technique of spray-painting, and the use and care of spray-painting equipment.

The training period lasts for one week. Classes will start on the following dates: Aug. 1 and 29, Oct. 3 and 31, and Nov. 28.

Special rates in Toledo hotels and boarding houses near the plant have been secured by the company for men attending the school. Complete information may be obtained by writing The DeVilbiss Company, Toledo, Ohio.

## Harry Crawford

Harry C. Crawford, for 18 years business manager and comptroller of Thompson Products, Inc., of Cleveland, joined International Piston Ring Company of the same city on Aug. 1. Mr. Crawford was appointed sales manager in charge of all domestic territory by Harry Gray, president of International Piston Ring Co.



"He hasn't tried to fix it himself!"

## Pierce-Arrow Liquidation Sale Expected Soon

Liquidation of the machinery and parts of the 1695 Elmwood Ave. Corp., formerly the Pierce-Arrow Motor Corp., Buffalo, will be started "as quickly as possible," executives of the new concern have stated.

Included in the items to be sold will be all machinery other than that used for building maintenance, all tools, office furniture, complete restaurant and hospital equipment and a small printing plant.

The buildings also are up for sale but are not included in the present liquidation plan. The service parts business of the corporation has been taken over by Walter E. Schott of Cincinnati, a former Pierce-Arrow creditor, in liquidation of his loans to the company, it was also announced.

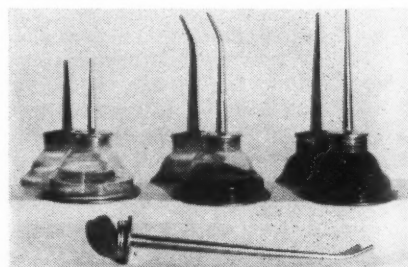
To facilitate the present liquidation, executives of the Elmwood Ave. Corp., which is owned by the Marine Trust Co. and the Federal Reserve Bank of New York, also former creditors of Pierce-Arrow, have engaged the services of the Morey Machinery Co. of New York.

This firm will act in an advisory capacity in the fixing of prices and in advertising policies. Sale of the equipment is expected to get underway shortly. No auction is planned but it is the intention of the Elmwood Ave. concern to accept "any reasonable price offered," executives said.

There are no prospects at present for the sale of the plant buildings, it was said. Several plans have been considered for dividing the buildings but none of these has been found practical as yet.

## See The Oil

The Universal Plastics Corp., 235 Jersey Avenue, New Brunswick, N. J., has introduced a new type of oil can, known as the Scan Can. It is made of transparent, non-breakable plastic material which is not affected by oils,



gasolines and their derivatives. The spout is a heavy gage copper plated material and can be unscrewed from the body of the can in the usual manner. It is furnished in two sizes,  $1\frac{1}{3}$  pint and  $\frac{1}{2}$  pint.

## Charges Battery In the Car

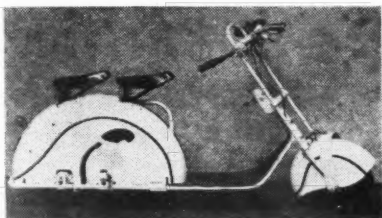
The Chereton Starter-Aid and Battery Charger is the latest product of Electrical Products Co., 6535 Russell Street, Detroit, Mich. Through its use the automobile owner is able to charge his own battery simply by plugging the device into the nearest electrical outlet and connecting it to convenient-



ly located terminals on the instrument panel of his car. It is particularly advantageous during cold weather, keeping the battery up to full charge, and keeping it warm during the night so that it does not lose its efficiency because of cold weather. The operation is automatic, and will cut off when the battery has reached full charge, so there is no danger of overcharging.

### New Power Scooter

A new power scooter, known as the "Master" power scooter, has been introduced by the Velox Motor Co., 5 Great Jones Street, New York City. It is powered by a 2.3 hp. Sachs motor, is reported to have a speed of 35 to 40 m.p.h., to give 100 miles per gallon of gasoline. Has a 2-speed transmission, wheelbase of 55 in., a



Bosch light-generator (eliminating batteries), a hand operating clutch to leave both feet free for support, and provision for second passenger seat. Special attention has been given to construction and design, resulting in an attractive streamline appearance, but with a weight of only 145 lb. List price \$225.

### Blackhawk Has New Bumper Lift Jack

The latest product of the Blackhawk Mfg. Co., 5325 West Rogers Street, Milwaukee, Wis., is a bumper lift jack, known as J-14. It has a hydraulic lift of 16 in. and 14 3/4 in. adjustable toe provides a lifting range of 30 3/4 in. Pump and release valve is located at the top of the jack, which permits the operator to stand erect while operating the jack. It is of one piece construction with a strong, seamless pump barrel which guarantees safety and eliminates leakage.



### To Sell Stutz Assets

Carl Wilde, Federal referee in bankruptcy, said an order would be entered to dispose of the assets of the Stutz Motor Car Co. as a result of a hearing on a creditor's petition for the sale. The date for the sale will be set later.

The trustee of the company reported that its assets were \$370,000 in real estate and \$86,827 in machinery and other property.

The principal creditor is the Reconstruction Finance Corp., to which \$266,000 is owed on a note for \$300,000, it was reported.

## Life Inaugurates Automotive Campaign

Most impressive recognition of the importance of independent service station operators in speeding up and keeping going the wheels of the country's business machine is found in the fact that *Life Magazine*, in inaugurating the biggest advertising campaign in automotive business papers in many years, has selected MOTOR AGE as one of the few magazines to aid in carrying out its program.

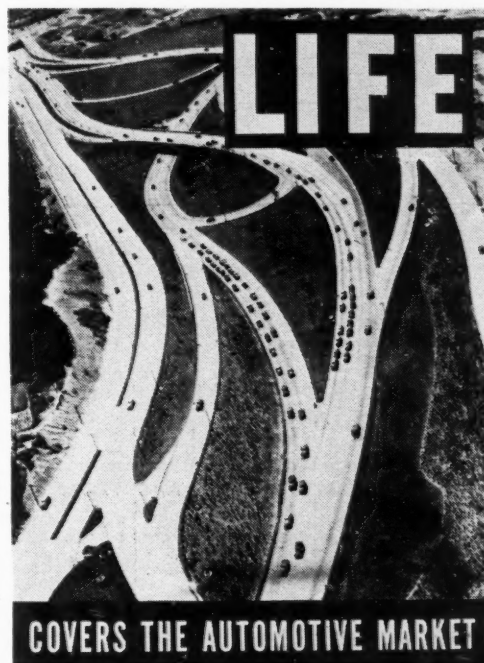
MOTOR AGE is naturally pleased to be one of the four automotive publications selected to carry the series of eight page inserts which will appear month after month. Besides MOTOR AGE the publications which will participate in the campaign are: *Automobile Trade Journal* and *Motor World Wholesale* (the other two members of the Chilton Merchandising and Service Group) and *Motor*.

In this series of eight page inserts the publishers of *Life* will present a photographic review of sidelights in connection with the activities of *Life's* automotive advertisers. The make-up of the eight pages is patterned after the *Life* format.

In revealing the plans of this unique advertising program, Mr. Howard Black, advertising director of *Life*, stated, "We have such a big story to tell in the automotive field that it deserves the most spectacular type of presentation. *Life's* influence on sales in the automotive field is tremendous. Every 1000 *Life* families own 999 automobiles. It has been proved to us by many surveys that *Life* readers buy more new cars and drive more up-to-date cars than the average. Figures show that the newer the car, the more miles it is driven each year and the more dollars spent on it for accessories and service. The average mileage of cars owned by *Life* readers is nearly 14,000 miles a year—far above the national average. It should be of great interest, therefore, to those in the automotive trade to see the products they sell advertised in such a potent sales-producing medium as *Life*. And, to those manufacturers in the automotive industry who are using *Life* to tell their story to the live, active automotive market, this new *Life* presentation in the automotive trade publications offers a plus-value in keeping the trade informed regarding their own product-advertising to the consumer. In addition to presenting news about automotive products advertised in *Life* the pages of these inserts each month will contain startling new facts about *Life* itself."

### 100-Octane Gasoline Used in Hughes Plane

One-hundred octane gasoline powered the two 1100 hp. Wright aeronautical engines in the Hughes' monoplane on its 91 hour flight around the world. This is the first extended over-water flight on 100-octane since its initial development for U. S. Army and Navy use.



Page one of the *LIFE* 8-page insert in automotive trade publications is made to resemble the front cover of *LIFE*. The photograph shows an intersection on the Long Island Parkway, near New York.

Outstanding feature of this remarkable accomplishment was the tremendous load lifted from the Floyd Bennett field at 7:20 p. m. July 10, when the Lockheed 14 was headed east for Le Bourget, France. The wing load lifted was 47 pounds per square foot, said by Howard Hughes to have been the greatest weight factor ever saddled on a heavier-than-air craft.

Over a good portion of the route, from New York to Moscow and from Minneapolis to New York, the engines functioned on 100-octane. Specific fuel consumption was throttled drastically during latter stages of the New York to Paris hop with the two motors turned down to about 30 per cent of their rated take-off horsepower. The engines were able to maintain speed from the more powerful fuel at the same time cutting down consumption. At stops in Moscow, Omsk, Yakutsk, U.S.S.R., and at Fairbanks, Alaska, the ship was fueled with 87-octane gasoline.

Technicians figure now that engines specifically designed for use of 100-octane gasoline will permit about 25 per cent increase in power or 12 per cent reduction in specific fuel consumption.

The difficulty of lifting a load of 47 pounds per square foot might easily have been too great with a less powerful fuel. Fuel consumption played an important part in the success of the trip, for the plane landed in France with only 300 gallons in the tanks.

Douglas Corrigan's 28-hour flight to Ireland "by mistake" cost \$69.60, the price of 290 gallons of gasoline at 24 cents a gallon.

He dumped 320 gallons of 73-octane in his tanks at Floyd Bennett field, New York, and had 30 left when he reached Baldonnel.

# Mechanical Specifications

These Specifications Are Brought Up-to-Date Each Month by the

Line Number	MAKE AND MODEL	Lowest Priced 4-d. Sed. (Divd.)	Wheelbase (In.)	Tire Size (In.)	ENGINE																	CHASSIS						
					No. of Cylinders, Bore and Stroke	Taxable Hp.	Piston Displacement (Cu. In.)	Maximum Brake HP. at Specified R.P.M.	Compression Ratio (to-1)	Displacement Factor §	Cylinder Head Material	Camshaft Drive Make	Piston Material	Oil Cleaner Make	Air Cleaner Make	Carburetor Make	Muffler Make	Electrical System Make	Battery Make	Clutch	Gearset Make	Universals Type and Make	Rear Axle Type and Make	Rear Axle Ratio	Front Spring Suspension			
																				Type and Make								
1	Bantam.....60	439	75	5.00/15	4-2.2x3.0	7.75	45.6	20-4000	7.00	....	Al	Gear	Als	No	No	Til	Buf	AL	Wil	P.Ro	WG	Nb-UP	1/2 Spi	5.87 Tr				
2	Buick.....38-40	1022	122	6.50/16	8-3 1/8 x 4 1/8	30.6	248.0	107-3400	6.15	39.2	CI	LB	Ala	No	AC	SM	Wal	DR	Del	P.Long	Own	m-Spi	1/2 Own	4.40 IC	IC			
3	Buick.....38-60	1272	126	7.00/15	8-3 1/8 x 4 1/8	37.8	320.2	141-3600	6.25	42.3	CI	LB	Ala	No	AC	SM	Wal	DR	Del	P.B&B	Own	m-Spi	1/2 Own	3.90 IC	IC			
4	Buick.....38-80	1645	133	7.00/16	8-3 1/8 x 4 1/8	37.8	320.2	141-3600	6.25	39.3	CI	LB	Ala	No	AC	SM	Wal	DR	Del	P.B&B	Own	m-Spi	1/2 Own	4.18 IC	IC			
5	Buick.....38-90	2176	140	7.50/16	8-3 1/8 x 4 1/8	37.8	320.2	141-3600	6.25	38.6	CI	LB	Ala	No	AC	SM	Wal	DR	Del	P.B&B	Own	m-Spi	1/2 Own	4.55 IC	IC			
6	Cadillac V8-38-60-60S	2085	127	7.00/16	8-3 1/8 x 4 1/8	39.2	346.0	135-3400	6.25	....	CI	Mor	Ala	No	AC	Str	Wal	DR	Del	P.Long	Own	Nb-Mec	1/2 Own	3.92 IC	IC			
7	Cadillac.....V8-38-65	2285	132	7.50/16	8-3 1/8 x 4 1/8	39.2	346.0	135-3400	6.25	42.8	CI	Mor	Ala	No	AC	Str	Wal	DR	Del	P.Long	Own	Nb-Mec	1/2 Own	4.58 IC	IC			
8	Cadillac.....V8-38-75	3075	141	7.50/16	8-3 1/8 x 4 1/8	39.2	346.0	140-3400	6.70	39.7	CI	Mor	Ala	No	AC	Str	Wal	DR	Del	P.Long	Own	Nb-Mec	1/2 Own	4.58 IC	IC			
9	Cadillac V-16.....38-90	5135	141	7.50/16	16-3 1/8 x 3 3/8	67.6	431.0	185-3600	6.80	....	CI	Mor	Ala	Fram	AC	Car	Wal	DR	Del	P.Long	Own	Nb-Mec	1/2 Own	4.31 IC	IC			
10	Chevrolet HB Master	730	112 1/4	6.00/16	6-3 1/8 x 3 3/8	29.4	216.5	85-3200	6.25	35.7	CI	Own	Cl	No	AC	Car	Own	DR	D	P.Own	Own	m-Own	1/2 Own	3.72 C	IC			
11	Chevrolet.....HA DeL.	796	112 1/4	6.00/16	6-3 1/8 x 3 3/8	29.4	216.5	85-3200	6.25	39.7	CI	Own	Cl	No	AC	Car	Own	DR	D	P.Own	Own	m-Own	1/2 Own	4.22 IC	IC			
12	Chrysler Roy. C-18	998	119	6.25/16	6-3 1/8 x 4 1/8	27.3	241.5	95-3600	6.20	39.3	CI*	Mor	Ala	Pur	BA	Car	NS	AL	Wil	P.B&B	Own	Nb-UP	1/2 Own	4.10 IC	IC			
13	Chrysler Imp. C-19	1198	125	6.50/16	8-3 1/8 x 4 1/8	33.8	298.6	110-3400	6.20	39.5	CI*	M-W	Ala	Pur	AC	Str	NS	AL	Wil	P.B&B	WG	Nb-UP	1/2 Own	3.91 IC	IC			
14	Chrysler Cus.Im.C-20	2295	144	7.50/16	8-3 1/8 x 4 1/8	33.8	323.5	130-3400	6.50	....	Al	M-W	Ala	Pur	AC	Str	NS	AL	Wil	P.B&B	WG	Nb-UP	1/2 Own	4.55 IC	IC			
15	De Soto.....S-5	958	119	6.00/16	6-3 1/8 x 4 1/8	27.3	228.1	93-3600	6.50	37.8	CI*	Mor	Ala	Pur	AC	Car	NS	AL	Wil	P.B&B	Own	Nb-UP	1/2 Own	4.10 IC	IC			
16	Dodge.....Six	898	115	6.00/16	6-3 1/8 x 4 1/8	25.3	217.8	87-3600	6.50	38.0	CI	Mor	Als	Pur	AC	Str	NS	AL	Wil	P.B&B	Own	Nb-UP	1/2 Own	4.10 C	C			
17	Ford.....V8-60	685 1/2	112	5.50/16	8-2 6/8 x 3.2	21.6	136.0	60-4200	6.60	30.0	Al	Gear	CS	No	Yes	Str	Own	O	Own	P.Os	Own	m-Spi	3/4 Own	4.44 Tr	Tr			
18	Ford.....V8-85	710 1/2	112	6.00/16	8-3 1/8 x 3 3/8	30.0	221.0	85-3800	6.12	37.5	Al	Gear	CS	No	Yes	Str	Own	O	Own	P.Os	Own	m-Spi	3/4 Own	3.78 Tr	Tr			
19	Graham.....Std., Spec.	1025	120	6.00/16	6-3 1/8 x 4 1/8	25.3	217.8	90-3600	6.70	35.3	Al	LB	Als	No	Bur	Mar	Old	DR	Wil	P.Long	WG	Nb-UP	1/2 Spi	4.27 C	C			
20	Graham S.c., Cus.S.C.	1198	120	(h)	6-3 1/8 x 4 1/8	25.3	217.8	116-4000	6.70	....	Al	LB	Als	Fram	Bur	Mar	Old	DR	Wil	P.Long	WG	Nb-UP	1/2 Spi	4.27 C	C			
21	Hudson 112.....89	755	112	5.50/16	6-3x4 1/8	21.6	175.0	83-4000	6.50	....	CI	GED	Al	No	Bur	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	1/2 Own	4.11 C	C			
22	Hudson Terrapl.....81	864	117	6.00/16	6-3x5	21.6	212.0	96-3900	6.25	38.0	CI	GED	Al	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	1/2 Own	4.11 C	C			
23	Hudson Terrapl.....82	915	117	6.00/16	6-3x5	21.6	212.0	101-4000	6.25	37.5	CI	GED	Al	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	1/2 Own	4.11 C	C			
24	Hudson 6.....83	984	122	6.00/16	6-3x5	21.6	212.0	101-4000	6.25	36.7	CI	GED	Al	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	1/2 Own	4.11 C	C			
25	Hudson 8.....84, 5, 7	1060	122, 129	6.50/16	8-3x4 1/2	28.8	254.5	122-4200	6.25	41.2	CI	GED	Al	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	1/2 Own	4.11 C	C			
26	Hupmobile Six.....E	1045	122	6.25/16	6-3 1/8 x 4 1/8	29.4	245.3	101-3600	5.75	42.2	CI	Mor	Als	No	AC	Car	Old	AL	Wil	P.B&B	WG	Nb-Spi	1/2 Spi	4.54 C	C			
27	Hupmobile Eight.....H	1325	125	6.50/16	8-3 1/8 x 4 1/8	32.5	303.2	120-3500	5.80	44.5	CI	Mor	Als	No	AC	Car	Old	AL	Wil	P.Long	WG	Nb-UP	1/2 Spi	4.54 C	C			
28	La Salle.....V8, 38-50	1385	124	7.00/16	8-3 1/8 x 4 1/8	36.4	322.0	125-3400	6.25	40.7	CI	Mor	Ala	No	AC	Car	Wal	DR	Del	P.Long	Own	Nb-Mec	1/2 Own	3.92 IC	IC			
29	Lincoln.....V12	(b) 1375 1/2	136-145	7.50/17	12-3 1/8 x 4 1/8	46.8	414.0	150-3400	6.38	34.3	Al	Ch	Al	Pur	AC	Str	Own	AL	Exi	P.Long	Own	m-Spi	FF Tim	4.58 C	C			
30	Lincoln Zephyr.....1375 1/2	125	125	7.00/16	12-2 3/8 x 3 3/8	36.3	267.0	110-3900	6.70	40.8	Al	Gear	CS	Fram	CG	Own	O	Own	P.Os	Own	m-Spi	3/4 Own	4.44 Tr	Tr				
31	Nash Lafay.....3810	850	117	6.00/16	6-3 1/8 x 4 1/8	27.3	234.8	95-3400	5.83	38.4	CI	Whit	Als	BS	AC	Str	Wal	AL	USL	P.B&B	Own	Nb-Mec	1/2 Own	4.11 C	C			
32	Nash.....Amb. 6, 3820	1050	121	6.25/16	6-3 1/8 x 4 1/8	27.3	234.8	105-3400	6.00	35.5	CI	Whit	Als	BS	AC	Mar	Wal	AL	USL	P.B&B	Own	Nb-Mec	1/2 Own	4.11 C	C			
33	Nash.....Amb. 8, 3880	1200	125	7.00/16	8-3 1/8 x 4 1/8	31.2	260.8	115-3400	6.00	35.0	CI	Dia	Als	BS	Bur	Str	Wal	AL	USL	P.B&B	Own	Nb-Mec	1/2 Own	4.10 C	C			
34	Oldsmobile.....F-38	967	117	6.50/16	6-3 1/8 x 4 1/8	28.4	229.7	95-3400	6.10	38.4	CI	Whit	Ala	No	AC	Car	Var	DR	D	P.B&B	Own	Nb-Mec	1/2 Own	4.37 IC	IC			
35	Oldsmobile.....L-38	1078	124	7.00/16	8-3 1/8 x 3 3/8	33.8	257.1	110-3600	6.20	41.7	CI	LB	Ala	No	AC	Car	Var	DR	D	P.B&B	Own	Nb-Mec	1/2 Own	4.37 IC	IC			
36	Packard Six.....1600	1175	122	6.50/16	6-3 1/8 x 4 1/8	29.4	245.3	100-3600	6.52	40.0	CI	Mor	Als	Pur	AC	CG	Old	DR	PD	P.Long	Own	Nb-Mec	1/2 Own	4.54 IC	IC			
37	Packard Eight 1601, 2	1325	127, 48	7.00/16	8-3 1/8 x 4 1/8	33.8	282.0	120-3800	6.60	41.4	Al	Mor	Als	Pur	AC	Str	Old	AL	PD	P.Long	Own	Nb-UP	1/2 Own	(b) 11 C	C			
38	Pack. Sup. 8. 1603, 4, 5	2790	127-34-39	7.50/16	8-3 1/8 x 5	32.5	320.0	130-3200	6.50	40.0	Al	Mor	Als	Pur	AC	Str	Old	AL	PD	P.Long	Own	Nb-UP	1/2 Own	4.69 IC	IC			
39	Pack. Twelve 1607, 8	4155	134, 39	8.25/16	12-3 1/8 x 4 1/8	56.7	473.0	175-3200	6.40	45.3	Al	Mor	Als	Pur	AC	Str	Old	AL	PD	P.Long	Own	Nb-Spi	1/2 Own	4.41 IC	IC			
40	Plymouth.....P5	730	112	5.50/16	6-3 1/8 x 4 1/8	23.4	201.3	82-3600	6.70	36.8	CI*	Mor	Ala	No	BA	BC	NS	AL	Wil	P.B&B	Own	Nb-UP	1/2 Own	3.90 C	C			
41	Plymouth.....P6	803	112	6.00/16	6-3 1/8 x 4 1/8	23.4	201.3	82-3600	6.70	36.2	CI*	Mor	Ala	No	BA	BC	NS	AL	Wil	P.B&B	Own	Nb-UP	1/2 Own	4.10 C	C			
42	Pontiac 6.....38-26DA	916	117	6.00/16	6-3 1/8 x 4	28.3	222.7	85-3520	6.20	37.4	CI	Mor	CHI	No	AC	Car	BH	DR	Del	P.Own	Own	Nb-Mec	1/2 Own	4.37 IC	IC			
43	Pontiac 8.....38-28DA	980	122	6.50/16	8-3 1/8 x 3 3/8	33.8	248.9	100-3700	6.20	40.0	CI	Mor	CHI	No	AC	Car	Buf	DR	Del	P.Own	Own	Nb-Mec	1/2 Own	4.37 IC	IC			
44	Stude. Com. & Sta. C.	965	116 1/2	6.00/16	6-3 1/8 x 4 1/8	26.3	226.0	90-3400	6.00	41.2	CI	Dia	Ly	Fram	AC	Str	Buf	AL	Wil	P.B&B	WG	Nb-Spi	1/2 Spi	4.55 IT	IT			
45	Studebaker. Pres. 4C	1195	122	6.50/16	8-3 1/8 x 4 1/8	30.0	250.4	110-3600	6.00	41.6	CI	Dia	Ly	Fram	AC	Str	Buf	DR	Wil	P.Long	WG	Nb-Spi	1/2 Spi	4.55 IT	IT			
46	Willys.....38	563 1/2	100	5.50/16	4-3 1/8 x 4 1/8	15.6	134.2	48-3200	5.70	31.6	CI*	LB	CI	F-O	AC	Til	Buf	AL	USL	P.R-B	WG	m-UP	1/2 Own	4.30 C	C			

**ABBREVIATIONS—General**  
 °—Others also  
 °—Measured on rim of Flywheel  
 1/2—Semi-floating  
 3/4—Three-quarter floating  
 ††—With clearance of .015 the valve is .004 off its seat.  
 †—Does not include Federal Taxes  
 §—Computed on basis of displacement, gear ratio, effective tire diameter, and weight with normal load.

(a)—(—1/4 to +1/2)  
 A—Above (rods removed from)  
 A—After top center  
 AA—Automatic adjuster  
 Ad—Advanced  
 Al—Aluminum  
 Ala—Aluminum, Anode processed  
 Als—Aluminum with struts  
 Au—Automatic  
 (b)—4.36-1601; 4.70-1602  
 B—Below (rods removed from)  
 B—Before top center

Bm—Before marks on vibration damper  
 (c)—1—1/8, 1—1/2  
 C—Conventional  
 C—Cold (Tappet clearance)  
 Ch—Chain  
 CHI—Chrome Nickel Iron  
 CI—Cast Iron CS—Cast Steel  
 CSM—Chain sprocket markings  
 (d)—0+0—1/2 (e)—0+1/4—0  
 (f)—1/4+1/4—0  
 F—Floating (Piston Pin)

FF—Full floating  
 (g)—138 in.-7.00/17; 147 in.-7.50/17  
 (h)—6.25/16 on standard, 6.50/16 on Custom.  
 H—Hot (tappet clearance)  
 (i)—4900-5100 IC—Independent coil  
 IT—Independent Transverse  
 (k)—Intake .0125; Exhaust .0156  
 Ly—Lynite  
 m—Metal  
 M—Mechanical N—Negative  
 (n)—Intake .0124; Exhaust .0156

Nb—Needle bearing  
 P—Piston (Pin Locked in)  
 P—Single plate clutch  
 PH—Power operated, hydraulic brakes  
 R—Rod (Pin locked in)  
 (r)—Out only Ru—Rubber  
 TC—Top Center  
 Tr—Transverse  
 Var—Various  
 x—At 1000 R.P.M.  
 y—At 2800 R.P.M.



# Tune-Up Specifications

Car Manufacturers and Supersede All Others Previously Published

				RINGS		VALVES										IGNITION										FRONT AXLE										
Service Brake Make and Type	Steering Gear Make	Compression Pressure at Cranking Speed (Lbs.)	Spark Plug Make and Type	No. and Width Comp.	No. and Width Oil	Piston Pin Diameter	Piston Pin Locked In	Head Diameter and Seat Angle				Operating Tappet Clearance	Intake Valve Opens Before or After T.C.		Breaker Points Gap (Ins.)	Timing				Rods Removed From	Crankpin Diameter (Ins.)	Crankpin Length (Ins.)	Capacity Crankcase (Qts.)	Capacity Cooling System (Qts.)	Caster (Degrees)	Camber (Degrees)	Toe-In (Inches)	King Pin Inclination (Degrees)	Line Number							
								Inlet (Ins.)	Inlet Seat Angle (Degrees)	Exhaust (Ins.)	Exhaust Seat Angle (Degrees)		Inlet	Exhaust		Inlet Tappet Clearance for Valve Timing	No. of Degrees	No. of Flywheel Teeth	Spark Plug Gap (Ins.)											Spark Occurs *TC	No. of Flyw. Teeth Spark Occurs TC	Breaker Housing				
OM La	90	AL-A9		2-3/8	1-7/8	3/8	R	1 1/32	30	1 1/32	30	.279	.006	.006	.006	19B	4 1/8	.022	.025	2 1/2	1B	Au	A	1 1/8	1 1/4	3 7/8	5	1/2	0° 9'	1 1/2	1					
OH S	112	AC-46		2(c)	2-3/8	3/8	R	1 1/32	45	1 1/32	45	.372	.015H	.015H	13B	5 1/8	.015	.025	4B	1 1/2	Au	A	2	1.21	6 13/16	5	1 1/2	0° 9'	1 1/2	2						
OH S	114	AC-46		2(c)	2-3/8	3/8	R	1 1/32	45	1 1/32	45	.372	.015H	.015H	14B	6B	.015	.025	6B	2 1/2	Au	A	2 1/4	1.31	8 17/16	5	1 1/2	0° 9'	1 1/2	3						
OH S	114	AC-46		2(c)	2-3/8	3/8	R	1 1/32	45	1 1/32	45	.372	.015H	.015H	14B	6B	.015	.025	6B	2 1/2	Au	A	2 1/4	1.31	8 17/16	5	1 1/2	0° 9'	1 1/2	4						
OH S	114	AC-46		2(c)	2-3/8	3/8	R	1 1/32	45	1 1/32	45	.372	.015H	.015H	14B	6B	.015	.025	6B	2 1/2	Au	A	2 1/4	1.31	8 17/16	5	1 1/2	0° 9'	1 1/2	5						
BH S	155	AC-45		2-1/8	2-3/8	3/8	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2 1/2	Au	A	2.46	2 1/2	7 24	N 3/4-0	1/2-1	5° 44'	6						
BH S	155	AC-45		2-1/8	2-3/8	3/8	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2 1/2	Au	A	2.46	2 1/2	7 25	0-1/2	0-1/2	5° 31'	7						
BH S	170	AC-45		2-1/8	2-3/8	3/8	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2 1/2	Au	A	2.46	2 1/2	7 25	0-1/2	0-1/2	5° 31'	8						
BH S	180	AC-45		2(c)	1-1/8	3/8	R	1.50	45	1.37	45	.341	AA	AA	AA	8B	3 1/2	.015	.027	6B	2 1/2	Au	A	2	1 1/4	11 30	0-1/2	0-1/2	5° 31'	9						
OH O	AC-46			2-1/8	1-1/8	3/8	R	1 1/32	30	1 1/32	30	.340	.006H	.013H	.006	9B	3 1/2	.021	.040	5B	2B	Au	A	2 1/4	1 1/2	5 14	1 1/4-2 1/4	1 1/4-1 1/2	7° 10'	10						
OH O	AC-46			2-1/8	1-1/8	3/8	R	1 1/32	30	1 1/32	30	.340	.006H	.013H	.006	9B	3 1/2	.021	.040	5B	2B	Au	A	2 1/4	1 1/2	5 14	1 1/4-2 1/4	1 1/4-1 1/2	7° 10'	11						
LH G	145x	AL-A7		2-1/8	2-3/8	3/8	F	1 1/32	45	1 1/32	45	.340	.008H	.010H	.014	8B	3 1/2	.020	.025	TC	TC	Au	A	2 1/8	1 1/2	5 20	1/2-2 1/2	(a)	0-1/2	4 1/2-6	12					
LH G	145x	AL-A7		2-1/8	2-3/8	3/8	F	1 1/32	45	1 1/32	45	.340	.006H	.010H	.011	2B	3 1/2	.018	.025	3B	1 1/2	Au	A	2 1/8	1 1/2	6 20	1/2-2 1/2	(a)	0-1/2	4 1/2-6	13					
LH G	155x	AL-A7		2-1/8	2-3/8	3/8	F	1 1/32	45	1 1/32	45	.340	.006H	.010H	.011	2B	3 1/2	.018	.025	TC	TC	Au	A	2 1/8	1 1/2	6 20	1-3	(a)	0-1/2	4 1/2-6	14					
LH G	145x	AL-A7		2-1/8	2-3/8	3/8	F	1 1/32	45	1 1/32	45	.340	.008H	.010H	.014	8B	3 1/2	.020	.025	TC	TC	Au	A	2 1/8	1 1/2	5 20	1/2-2 1/2	(a)	0-1/2	4 1/2-6	15					
LH O	140x	AL-A7		2-1/8	2-3/8	3/8	F	1 1/32	45	1 1/32	45	.340	.006H	.008H	.011	6A	2 1/2	.020	.025	4A	1 1/2	Au	A	2 1/8	1	5 15	1-3	1/4-3/4	0-1/2	4 1/2-5 1/2	16					
OM O	150y	Ch-H-10		2-3/8	1-5/8	3/4	F	1.28	45	1.28	45	.279	.013C	.013C	.013	9 1/2	3B	.015	.025	4B	1 1/2	Au	A	1.60	1.54	4 15.2	8	1	1 1/2-1 1/2	8	17					
OM O	100	Ch-7		2-3/8	1-3/4	3/4	F	1 1/32	45	1 1/32	45	.310	.013C	.013C	.013	9 1/2	3B	.015	.025	4B	1 1/2	Au	A	2	1 1/2	5 22	8	1	1 1/2-1 1/2	8	18					
OH R	160x	Ch-J-9		2-3/8	1-1/8	3/8	R	1 1/32	30	1 1/32	45	.310	.010H	.010H	.012	4 1/2	1 1/2	.018	.025	TC	TC	Au	A	2 1/8	1 1/2	5 13 1/2	3-4	1	1/2-1 1/2	7 1/2	19					
OH R	120	Ch-J-9		2-3/8	1-1/8	3/8	R	1 1/32	30	1 1/32	45	.310	.010H	.010H	.012	4 1/2	1 1/2	.018	.025	4A	1 1/2	Au	A	2 1/8	1 1/2	5 13 1/2	3-4	1	1/2-1 1/2	7 1/2	20					
HMG	115	Ch-J-8-A		2-3/8	2-1/8	3/4	F	1 1/32	45	1 1/32	45	.310	.006	.008	.010	10 1/2	4B	.020	.032	TC	TC	Au	A	1 1/2	1 1/2	4 12 1/2	2-3	1-1 1/2	0-1/2	7	21					
HMG	120	Ch-J-8-A		2-3/8	2-1/8	3/4	F	1 1/32	45	1 1/32	45	.310	.006	.008	.010	10 1/2	4B	.020	.032	TC	TC	Au	A	1 1/2	1 1/2	4 12 1/2	2-3	1-1 1/2	0-1/2	7	22					
HMG	120	Ch-J-8-A		2-3/8	2-1/8	3/4	F	1 1/32	45	1 1/32	45	.310	.006	.008	.010	10 1/2	4B	.020	.032	TC	TC	Au	A	1 1/2	1 1/2	4 12 1/2	2-3	1-1 1/2	0-1/2	7	23					
HMG	120	Ch-J-8-A		2-3/8	2-1/8	3/4	F	1 1/32	45	1 1/32	45	.310	.006	.008	.010	10 1/2	4B	.020	.032	TC	TC	Au	A	1 1/2	1 1/2	4 12 1/2	2-3	1-1 1/2	0-1/2	7	24					
HMG	118	Ch-J-8-A		2-3/8	2-1/8	3/4	F	1 1/32	45	1 1/32	45	.310	.006	.008	.010	10 1/2	4B	.017	.032	TC	TC	Au	A	1 1/2	1 1/2	7 17 1/2	2-3	1-1 1/2	0-1/2	7	25					
H G	107	Ch-7		2-1/8	2-3/8	3/8	F	1 1/32	45	1 1/32	45	.341	.010	.013	.010	2B	3 1/2	.022	.027	7B	2 1/2	Au	A	2 1/8	1 1/4	6 18	1 1/2	1	1 1/2-1 1/2	8 1/2	26					
H G	113	Ch-7		2-1/8	2-3/8	3/8	F	1 1/32	45	1 1/32	45	.341	.006	.013	.010	1A	3 1/2	.015	.027	7B	2 1/2	Au	B	2 1/8	1 1/4	8 21.5	1 1/2	1	1 1/2-1 1/2	8 1/2	27					
BH S	155x	AC-45		2-1/8	2-3/8	3/8	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	2 1/2	Au	A	2 1/8	2 1/2	7 25	N 3/4-0	1/2-1	5° 44'	28						
OM O	105	Ch-7		2-1/8	2-3/8	3/8	F	1 1/32	45	1 1/32	45	.311	AA	AA	AA	21B	6 1/2	.020	.029	7B	2 1/2	Au	B	2 1/8	2	12 32	1 1/2	1	1 1/2-1 1/2	7 1/2	29					
OM O	105	Ch-H-10		2-3/8	1-3/4	3/4	F	1.54	45	1.54	45	.311	AA	AA	AA	19 1/2	6B	.015	.029	4B	1 1/2	Au	A	2 1/8	1.57	5 30	4	1	1 1/2-1 1/2	4	30					
BH G	110	AL-B7		2-1/8	2-3/8	3/8	F	1 1/32	45	1 1/32	45	.340	.015	.015	.015	CSM	CSM	.020	.025	4A	1 1/2	Au	A	2	1.42	6 20	1-2	0-1 1/2	0-1 1/2	7	31					
BH G	125	AC-45		2-1/8	2-3/8	3/8	F	1 1/32	45	1 1/32	45	.372	.008H	.015H	.008	CSM	CSM	.020	.025	4B	1 1/2	Au	A	2	1.42	7 20	1-2	0-1 1/2	0-1 1/2	7	32					
BH G	125	AC-45		2-1/8	2-3/8	3/8	F	1 1/32	45	1 1/32	45	.375	.015H	.015H	.015	CSM	CSM	.020	.025	9B	2 1/2	Au	B	2	1.24	7 18	1-2	0-1 1/2	0-1 1/2	7	33					
BH S	146x	AC-45		2-1/8	2-3/8	3/8	P	1 1/32	30	1 1/32	45	.310	.008H	.011H	(k)	5B	2B	.020	.040	TC	TC	Au	A	2 1/8	1 1/2	6 17	0-N 3/4	1/2-1	4° 51'	34						
BH S	152x	AC-45		2-1/8	2-3/8	3/8	P	1 1/32	30	1 1/32	45	.310	.008H	.011H	(n)	5B	2B	.020	.040	TC	TC	Au	A	2 1/8	1 1/2	6 17	0-N 3/4	1/2-1	4° 51'	35						
H O	110	AC-103 (2)		2-1/8	1-1/8	3/8	F	1.57	30	1 1/32	45	.340	.007H	.010H	1B	1 1/2	.020	.028	6B	2 1/2	Au	A	2 1/8	1 1/4	6 15	1 1/2-1 1/2	1 1/2-1 1/2	(e)	1° 54'	36						
H O	110	AC-103 (2)		2-1/8	1-1/8	3/8	F	1 1/32	30	1 1/32	45	.340	.007H	.010H	1B	1 1/2	.020	.028	6B	2 1/2	Au	A	2 1/8	1 1/4	6 16	1 1/2-1 1/2	1 1/2-1 1/2	(e)	1° 54'	37						
H O	110	AC-103 (2)		2-1/8	1-1/8	3/8	F	1 1/32	30	1 1/32	45	.340	.006H	.008H	30B	12 1/2	.015	.028	6B	2 1/2	Au	B	2 1/8	1 1/4	8 20	1 1/2-1 1/2	1 1/2-1 1/2	(f)	1 1/2	38						
BPH O	110	AC-103 (2)		3-1/8	1-3/4	3/8	F	1 1/32	45	1 1/32	45	.340	AA	AA	TC	TC	.020	.028	6B	2 1/2	Au	B	2 1/8	1 1/4	10 40	(d)	1 1/2-1 1/2	1 1/2-1 1/2	(f)	1 1/2	39					
LH O	145x	Ch-J-8		2-1/8	2-3/8	3/8	F	1 1/32	45	1 1/32	45	.340	.006H	.008H	.011	6A	2 1/2	.020	.025																	

# Motor Car Price, Weight and Body Table

Following are delivered prices at factory for cars with standard equipment and include all federal taxes with exception of Ford, Lincoln and Willys. Optional equipment, state or local taxes, transportation charges and finance charges are extra.

BODY, MAKE AND MODEL	Delivered Price	Shipping Weight	BODY, MAKE AND MODEL	Delivered Price	Shipping Weight	BODY, MAKE AND MODEL	Delivered Price	Shipping Weight	BODY, MAKE AND MODEL	Delivered Price	Shipping Weight	BODY, MAKE AND MODEL	Delivered Price	Shipping Weight	BODY, MAKE AND MODEL	Delivered Price	Shipping Weight
BANTAM			CHEVROLET (Cont.)			FORD (Cont.)			HUDSON (Cont.)			NASH (Cont.)			PACKARD (Cont.)		
Std. Coupe	399	1240	Twn. Sed., Trk. 2d	689	2825	Coupe, 5W	685	2709	Conv. Coupe, 2d	926	2780	Nash-Ambass	ador		Tour. Sed., 4d.	4155	5525
Spec. Roadster	449	1130	Spt. Sed., Trk., 4d	750	2845	Conv. Coupe	770		Conv. Bro., 2d.	990	2860	Six			Club Sedan	4255	5520
Std. Roadster	479	1140	Bus. Coupe, 2d.	648		Conv. Sedan	900	2986				Bus. Coupe	970	3300	Coupe, 5p	4185	5415
DeLuxe Rdstr.	525	1160	Cabriolet, 2d.	755		Conv. Club Coupe	800		6-82 Super			A. P. Coupe	1015	3360	+Coupe, 2-4p.	4135	5255
Speedster	497	1205				Club Coupe	745	2791	Coupe, 3p, 2d	845	2755	Sedan, 2d.	1000	3450	+Conv. Cpe., 2-4p.	4370	5255
DeL. Speedster	549	1215	Master						Brougham, 2d	878	2865	Sedan, 4d.	1050	3460	+Victoria	5230	5345
Sta. Wagon	565	1390	De Luxe Series HA						Tour. Bro., 2d.	899	2870	Cabriolet, 2d.	1090	3340	Chassis	2950	3910
BUICK			Sedan, 4d.	796	2915	GRAHAM			Sedan, 4d.	915	2925	Nash-Ambass	ador		Twelve-1608		
Special 49			Coach, 2d.	730	2900	Standard			Tour. Sedan, 4d.	935	2930	Eight			Tour. Sedan, 7p.	4485	5600
Tour. Sedan, 2d.	981	3515	Tn. Sed., Trk., 2d	750	2915	Coupe	995		Conv. Coupe, 2d	971	2835	Bus. Coupe	1120	3580	Tour. Lim.	4690	5660
Sport Sedan, 2d.	1006	3520	Spt. Sed., Trk., 4d	817	2940	Comb. Coupe	1045		Conv. Bro., 2d.	1034	2880	A. P. Coupe	1165	3640	+Conv. Sedan	5390	5680
Sport Sedan, 4d.	1022	3535	Bus. Coupe, 2d	714		Sedan, 4d.	1025					Sedan, 2d.	1150	3780	Chassis	3140	3965
Tour. Sedan, 4d.	1047	3560	Sport Coupe, 2d	750	2870	Special			HUPMOBILE			Sedan, 4d.	1200	3790			
Bus. Coupe, 2d.	945	3385	CHRYSLER			Bus. Coupe	1095		Six			Cabriolet, 2d.	1240	3620	PLYMOUTH		
Sport Coupe, 2d.	1001	3425	Royal Six			Comb. Coupe	1135		Tour. Sedan, 4d.	1045	3320	OLDSMOBILE			Roadking		
Conv. Coupe, 2d.	1103	3575	Bus. Coupe, 2d	918	3090	Sedan, 4d.	1075		Sedan, 4d.	1180	3370	Six			Six P5		
Conv. Phae., 4d.	1406	3705	Coupe, 2d.	963	3135	Supercharger			DeL. Sed., 4d	1222	3400	Bus. Coupe, 2d.	870	3205	Coupe, 2d	645	2739
Century 60			Conv. Coupe	1085	3250	Comb. Coupe	1270		Custom Sed., 4d.	1340	3440	Club Coupe, 2d	926	3195	Sedan, 2d	685	2764
Tour. Sedan, 2d.	1256	3760	Tour. Bro., 2d.	975	3165	Sedan, 4d.	1198		Eight			Sedan, 2d.	916	3275	Tour. Sedan, 2d	701	2779
Sport Sedan, 4d.	1272	3785	Brougham, 2d	963	3160	Custom Super			Tour. Sed., 4d.	1325	3955	Tr. Sed., Trk., 2d	941	3265	Tour. Sedan, 4d	746	2824
Tour. Sedan, 4d.	1237	3780	Tour. Sedan, 4d.	1010	3180	Charger			DeL. Tr. Sed., 4d	1365	4085	Tr. Sed., Trk., 4d	967	3285			
Sport Coupe, 2d.	1225	3690	Sedan, 4d	998	3170	Bus. Coupe	1320		Cus. Tr. Sed., 4d.	1485	4125	Conv. Coupe, 2d.	1043	3360	De Luxe		
Conv. Coupe, 2d.	1359	3815	Conv. Sedan	1425	3450	Comb. Coupe	1360							Six-P8			
Conv. Phae. 4d.	1713	3950	Sedan, 7p., 4d.	1235	3450	Sedan, 4d.	1320		LA SALLE			Eight			Coupe, 2p	730	2754
Roadmaster 80			Sed. Lim., 7p., 4d	1325	3545				Series 38-50			Bus. Coupe, 2d.	986	3400	Coupe, 2-4p.	770	2799
Phae., Conv., 4d.	1983	4325	N.Y. Spec. Coupe	1255		HUDSON			Conv. Coupe	1420	3735	Club Coupe, 2d.	1032	3385	Conv. Coupe, 2d.	850	2964
Tour. Sedan, 4d.	1645	4245	N.Y. Spec. Sedan	1370	3600	112			Conv. Sedan	1825	3870	Sedan, 2d.	1027	3475	Sedan, 2d	773	2814
For. Sed., Tk., 41	1753	4305	Imperial Eight			Brougham, 2d	724	2595	Coupe	1295	3745	Tour. Sedan, 2d.	1053	3465	Sedan, 4d	803	2834
Sport Sedan, 4d.	1645	4245	Bus. Coupe, 2d.	1123	3450	Tour. Bro., 2d	743	2600	Tour. Coupe	1345	3800	Sedan, 4d.	1078	3490	Tour. Sedan, 2d	765	2819
Limited 90			Coupe, 2d	1160	3515	Tour. Sedan, 4d	775	2625	Tour. Sedan, 4d.	1385	3830	Tour. Sedan, 4d	1104	3480	Tour. Sedan, 4d	815	2844
Tour. Sedan, 4d.	2350	4585	Tour. Bro., 2d.	1165	3560	Conv. Coupe, 2d	835	2545				Conv. Coupe, 2d.	1160	3530	Sedan, 7p	1005	3239
Lim. Trunk, 4d.	2453	4665	Tour. Sedan, 4d	1198	3565	Conv. Sedan, 4d.	1595							Sedan Lim.	1095		
Tour. Sedan, 4d.	2176	4580	Conv. Coupe	1275	3630												
CADILLAC			Custom Imp. 8			112 De Luxe			LINCOLN			PACKARD			PONTIAC		
V8-Series 60			Sedan, 5p.	2295	4495	Coupe, 3p	704	2500	V12-136 in.	wb.		Six-1600			De Luxe Six		
Coupe, 2p.	1695	3855	Sedan, 4d., 7p.	2295	4510	Brougham, 2d	734	2595	Conv. Roadster	5300		Tour. Sedan, 4d.	1070	3525	Bus. Coupe, 2d.	835	3190
Tour. Sedan, 5p.	1780	3940	Sed. Lim., 4d., 7p.	2395		Tour. Bro., 2d	753	2600	Coupe	5300	5435	Tour. Sedan, 2d.	1045	3475	Sedan, 2d	865	3265
Conv. Coupe, 5p.	1815	3845				Vic. Coupe, 2d	750	2540	Wilby Coupe	5900	5615	Club Coupe	1020	3425	Sport Coupe, 2d	881	3200
Conv. Sedan, 5p.	2215	3980	DE SOTO			Sedan, 4d	765	2620	Sedan, 4d.	4900	5735	Conv. Cpe., 2-4p.	1135	3500	Tour. Sedan, 2d	881	3265
V8-Series 60-S			Bus. Coupe, 2d.	870	3039	Tour. Sedan, 4d	785	2625	Brunn Vict.	5900	5530	Business Coupe	975	3450	Cabriolet, 2d	983	3265
*Tour. Sedan, 5p	2090	4170	Coupe, rumb., 2d			Conv. Coupe, 2d	840	2545				Chassis	710	2485	Sedan, 4d	916	3255
V8-Series 65			Brougham, 2d			Conv. Bro., 2d.	891	2610	V12-145 in.	wb.		Eight-1601			Tour. Sedan, 4d.	942	3260
*Conv. Sedan, 5p	2605	4520	Tour. Bro., 2d.	930	3119	6-83			Wilby Tour.	5900		Tour. Sedan, 4d.	1325	3650	Conv. Sedan	1310	
Tour. Sedan, 5p	2230	4540	Sedan, 4d	958	3134	Coupe, 3p., 2d.	909	2825	Jud. Berline	6000	5770	Tour. Sedan, 2d.	1295	3600	De Luxe Eight		
T. Sed., 5p. (Div.)	2360	4580	Tour. Sedan, 4d	970	3139	Brougham, 2d	948	2935	Jud. Berline	6100	5840	Tour. Sedan, 2d.	1295	3600	Bus. Coupe, 2d.	888	3320
V8-Series 75			Conv. Coupe	1045	3229	Tour. Bro., 2d.	968	2940	Jud. Sed. Lim.	6300	5950	Club Coupe	1270	3550	Sedan, 2d	934	3395
Conv. Coupe, 2p.	3380	4665	Conv. Sedan, 4d	1375	3394	Vic. Coupe, 2d	955	2880	Brunn Cabriolet	6900	6010	Conv. Cpe., 2-4p.	1365	3625	Sport Coupe, 2d	955	3325
Conv. Sed., Trk.	3945	5110	Sedan, 7p., 4d.	1195	3439	Sedan, 4d	984	3005	Brunn Cabriolet	7000	6030	Conv. Sedan	1650	3775	Tour. Sedan, 2d	960	3385
Coupe, 2p.	3230	4675	Limousine, 7p	1285	3524	Tour. Sedan, 4d	1005	3010	Brunn Tour. Cab	7200	5870	Bus. Coupe	1225	3570	Cabriolet, 2d	1057	3390
Coupe, 3-5p.	3393	4775	DODGE			Conv. Coupe	1041	2895	Brunn Brougham	7000	6120	Chassis	960	2620	Sedan, 4d	980	3415
Town Sedan, 5p.	3635	4900	Bus. Coupe, 2d.	808	2877	Conv. Bro.	1104	2975	Sedan	5100	5980	Eight-De Luxe-1601-D			Tour. Sedan, 4d.	1006	3410
Tour. Sedan, 5p.	3080	4865	Coupe, 2d	858	2952	8-84 De Luxe			Limousine	5200	5970	Tour. Sedan	1540	3685	Conv. Sedan	1353	3530
Tour. Sedan Div.	3155	4925	Conv. Coupe, 2d	960	3122	Coupe, 3p, 2d	990	3010	Conv. Sed. LeB.	5800	5670	Eight-1602			STUDEBAKER		
Formal Sed., 5p	3935	4865	Coupe, 2d	858	2977	Brougham, 2d	1028	3115	Conv. Sed. LeB.	6000	5780	Tour. Sedan, 7p.	1955	4195	Commander		
Formal Sed., 5p	3995	5105	Sedan, 2d	870	2957	Vic. Coupe, 2d.	1021	3060	Wilby Lim.	6200	6140	Tour. Lim.	2110	4245	Bus. Coupe, 3p.	875	3045
Tour. Sedan, 7p	3210	4945	Tour. Sedan 2d	898	2977	Tour. Bro., 2d.	1049	3120	Wilby Sport Sed.	7000	6030				Cus. Coupe, 3 p.	900	3050
Bus. Tr. Sed., 6p	3105	4945	Sedan, 4d	910	2967	Sedan, 4d	1060	3155	Wilby Panel Bro.	7400		Super-Eight-1603			Club Sedan	955	3140
Tour. Sedan, 7p	3360	5105	Tour. Sedan, 4d	910	2967	Tour. Sedan, 4d	1080	3160	LINCOLN-ZEPHYR			Tour. Sedan, 4d.	2790	4530	Cruis. Sedan	965	3190
Bus. Tr. Imp., 8p	3260	5105	Sedan, 4d., 7p.	1095	3332	Conv. Coupe	1121	3060	Coupe, 3p, 2d	1295	3410	Chassis	2090	3300	State Comm	der	
Town Car, 7p	5115	5175	Conv. Sedan, 4d.	1275	3308	Conv. Bro.	1185	3140	Sedan, 4d.	1375	3560				Bus. Coupe	965	3095
16-Series 90			Limousine, 4d.	1185		8-85 Custom			Sedan, 2d.	1355	3525	Super-Eight-1604			Club Sedan	1030	3160
Conv. Coupe, 2p.	5440	4905	FORD			Coupe, 3p, 2d	1080	3020	Limousine, 4d.	1550	3590	Formal Sedan	3710	4795	Cruis. Sedan	1040	3215
Conv. Sed., Trk.	6000	5350	V8-60			Brougham, 2d	1134	3140	Conv. Coupe	1650	3605	Tour. Sedan, 4d.	2995	4670	Conv. Sedan	1365	3415
Coupe, 2p.	5340	4915	Tudor Sedan	640	2553	Vic. Coupe, 2d	1131	3080				Club Sedan	2990	4600	State Preside	nt	
Coupe, 5p.	5440	5015	Fordor Sedan	685	2579	Tour. Bro., 2d.	1155	3145	NASH			Coupe, 5p.	2965	4595	Cus. Coupe	1130	3315
Town Sedan, 5p.	5695	5140	Coupe, 5W	595	2452	Sedan, 4d.	1171	3190	Nash-La Fayette			Conv. Cpe., 2-4p.	3210	4585	Club Sedan	1195	3400
Sedan, 5p	5140	5105	Standard			Tour. Sedan, 2d	1191	3195	Master			Victoria	3670	4650	Cruis. Sedan	1205	3455
Tour. Sed., (Div.)	5215	5165	V8-85			Country Club			Bus. Coupe	770	3120	Chassis	2170	3375	Conv. Sedan	1555	3680
Formal Sed., 5p.	6055	5105	Tudor Sedan	665	2777	8-87			Sedan, 2d.	805	3190	Super-Eight-1605			WILLYS		
Formal Sed., 7p	6055	5345	Fordor Sedan	710	2800	Tour. Sedan, 4d.	1219	3275	Sedan, 4d.	850	3200	Tour. Sedan, 7p.	3165	4700	Model 38		</

\*-5 Wheel Equipment

†-6 Wheel Equipment



## Truck Tune-Up Specifications

[illegible]

## ABBREVIATIONS

G-Cold

H-Hot

Her — Hercules

Wau-Waukecha

# PARTS PRICES

## Buick Series 40-Special-8 Cylinder-1938

Prices Shown Effective as of January 1, 1938

Front Suspension			Engine Parts—continued			Rear Axle—continued		
Mfr's Part No.	No. List Per Car	Price Each	Mfr's Part No.	No. List Per Car	Price Each	Mfr's Part No.	No. List Per Car	Price Each
1394255—Knuckle, L. ....	1	\$7.50	226100—Piston pin .....	8	\$0.55	1298941—Differential pinion. 2	\$1.25	
1297865—Knuckle support, L. 1	5.00		1394536—Connecting rod ... 8	3.85		1302327—Diff. side gear .... 2	4.25	
1286029—King pin .....	2	1.00	1295704—Inlet valve .....	8	.75	1394154—Pinion & ring gear 1	22.50	
1266849—King pin bush. .... 4	.15		1266751—Exhaust valve .... 8	1.25		970301—Ring gear rivet .... 12	.03	
134630—Pin thrust brg. .... 2	.50		1298890—Valve spring, inner 16	.15		5126X—Pinion bearing, F. ... 1	6.90	
230857—King pin lock pin ... 2	.15		1298891—Valve spring, outer 16	.20		C1506—Pinion bearing, R. ... 1	3.95	
231760—Upper arm pin .....	2	.30	1291217—Valve key .....	32	.05	KA-11445Z—Diff. bearing... 2	...	
1298827—Pin bushing, F. .... 2	.35		1285035—Valve guide .....	16	.40	1296810—Grease retainer, in. 2	.50	
500863—Pin bushing, R. .... 2	.35		1292993—Valve lifter .....	16	.85	1296811—Grease retainer, out. 2	.50	
231994—Sup. arm, low., R. F. and L. R. .... 2	3.50		1302651—Valve adj. screw ... 16	.15		1396407—Axle shaft, L. .... 1	8.75	
231759—Low. arm pin, out. ... 2	.60		1301937—Valve push rod ... 16	.60		C1502—Rear wheel bearing. 2	3.65	
231743—Low. pin bush. .... 2	.50		1298194—Inlet rocker arm, 1st type .....	8	1.00	IR1502—Rear brg. race .... 2	1.20	
231996—Low. arm, in. shaft. 2	1.75		1298195—Exh. rocker arm, 1st type .....	8	1.00	1303945—Rear wheel, prime. 2	9.50	
1304860—Inner shaft bush. ... 4	.50		1394146—Rocker arm shaft, 1st type .....	1	3.50	1293548—Rear brake drum. ... 2	5.00	
1305874—Coil spring, 5 whl. ... 2	5.00		1292483—Rocker arm bushing 16	.15		1300353—Backing plate, L. ... 1	3.15	
1305386—Coil spring, 6 whl. ... 2	5.00		1394376—Timing case cover. 1	1.50		1302936—Torque tube .....	25.00	
1305259—Tie rod, long .....	1	2.50	1266655—Timing chain .....	1	4.90	Rear Springs		
1305260—Tie rod, short .....	1	3.25	1266654—Crankshaft sprocket 1	1.60		1304057—Coil spring .....	2	5.75
1394531—End assem., L. .... 1	2.85		1266653—Camshaft sprocket. 1	2.00		1305365—Coil springs, spl. ... 2	6.75	
1305264—Ball stud seat .....	4	.30	MAIN BEARINGS			1305975—Radius rod .....	1	1.60
1305269—Seat spring .....	2	.15	1394196—Brg. set (reamed to to size) .....	1	10.55	1305839—Radius rod bush. ... 4	.10	
1303409—Knuckle arm, L. .... 1	1.75		Engine Oiling			Electrical		
1303945—Front wheel, prime 2	9.50		1288280—Oil pump body .... 1	4.00		1110801—Distributor assem. ... 1	10.00	
1399542—Front wheel hub ... 2	5.25		1266794—Pump shaft .....	1	1.00	1837494—Distributor cap .... 1	1.50	
1291516—Front hub & drum. ... 2	10.25		1305545—Pump driven gear. ... 1	1.00		681H—Dist. vacuum control 1	1.25	
1293548—Front brake drum. ... 2	5.00		1305543—Pump idler gear ... 1	1.00		1842058—Contact arm .....	.50	
0909042—Wheel bearing, in. ... 2	3.20		1247328—Relief valve .....	1	.15	1871862—Contact point .... 1	.30	
0909001—Wheel bearing, out. ... 2	1.95		Clutch			1836893—Rotor .....	.30	
231713—Grease felt .....	2	.20	*1301588—Housing .....	1	11.00	1869704—Condenser .....	.40	
1394331—Brake lining, pri., set 4 wheels .....	1	3.50	1301942—Housing .....	1	11.00	526B—Ignition coil .....	2.50	
1394378—Brake lining, sec., set 4 wheels .....	1	3.75	1302299—Release bearing ... 1	2.00		1291953—Ignition switch cyl. 1	.50	
1304881—Backing plate, L. ... 1	2.70		1302292—Disc & facing .... 1	9.75		1994501—Lighting switch .... 1	1.25	
Steering			1302710—Press. plate only ... 1	3.25		476S—Stop light switch .... 1	.30	
264250—Pitman arm .....	1	2.25	1240214—Clutch cover .....	1	2.00	1542—Starter solenoid .... 1	7.00	
263278—Cross shaft .....	1	6.50	227847—Pressure spring .... 9	.20		1868512—Starter vac. switch 1	1.50	
263305—Cross shaft bush. ... 1	.30		1302023—Spline shaft .....	1	11.00	471T—Dimmer switch .....	.65	
263463—Cross shaft seal .... 1	.35		99004—Pilot bearing .....	1	1.15	857854—Ammeter .....	1.80	
264323—Tube and worm .....	1	8.00	47507X—Spline shaft brg., R. 1	...		1101052—Generator assembly 1	20.00	
11BC—Worm bearing cone. ... 2	.85		*447106—Spline shaft brg., R. 1	...		1860344—Generator brush ... 2	.15	
14CE—Worm bearing cup. ... 2	1.05		Self-shifting Transmission			1850768—Gen. 3rd brush ... 1	.15	
264321—Jacket tube .....	1	3.50	For parts prices of conventional trans- mission see Series 40, 1937 page 231 (Parts Numbers Do Not Apply)			1866789—Gen. armature exch. 1	4.50	
*264510—Jacket tube .....	1	3.50	1304749—Case .....	1	18.00	812823—Comm. end bushing. 1	.15	
262159—Jacket tube brg. ... 1	.70		1394538—Gear set, F. end ... 1	25.00		3203—Drive end bearing ... 1	1.15	
1298345—Steering wheel .... 1	7.50		1299538—Mainshaft .....	1	7.50	1869430—Gen. field coil set. 1	1.50	
1303870—Steering wheel Del. 1	16.00		3206X—Mnshft. brg., R. .... 1	4.00		5807—Voltage regulator .... 1	4.00	
Cooling			954191—Thrust washers .... 6	.35		734Z—Starter assembly .... 1	...	
3109321—Rad. core assem. ... 1	36.00		1299546—Gear assem., F. unit drive .....	1	10.00	1857960—Starter brush, set. 1	.30	
1304599—Radiator shell, pri. 1	24.00		1299543—Gear assem., F. unit, center .....	1	4.00	823881—Starter arm, exch. ... 1	5.00	
1303875—Radiator grille, L. 1	12.00		1299518—Hub assem., F. unit clutch .....	1	13.00	1839345—Drive end bushing. 1	.10	
1297753—Water pump body. ... 1	4.50		1299534—Hub, R. unit clutch ... 1	4.00		1843041—Starter clutch .... 1	3.50	
1266921—Pump body cover. ... 1	.20		1299542—Drum, F. unit clutch 1	4.00		667N—Headlamp assem., L. 1	12.50	
1394534—Shaft and impeller. ... 1	2.25		1299527—Drum, R. unit clutch 1	4.00		922117—Headlamp body, L. 1	5.00	
1295006—Body bushing, F. ... 1	.30		1299549—Drum, F. unit brake 1	2.50		920456—Headlamp reflector. 2	1.25	
1296064—Body bushing, R. ... 1	.40		1299524—Drum assem., R. unit brake .....	1	3.50	920591—Headlamp midlg., L. 1	1.25	
1300796—Pump packing .... 4	.10		1299660—Brake band assem. 2	2.50		920491—Headlamp lens, L. ... 1	1.85	
1302387—Fan blades .....	1	1.15	1299535—Plate, clutch drive. 13	.65		389A—Rear lamp, L. .... 1	4.25	
1266943—Fan belt .....	1	1.30	1299536—Plate, clutch driven 11	1.25		390A—License lamp .....	1	3.25
Fuel and Exhaust Systems			1299875—Plate, clutch press. 2	1.75		921799—Rear lamp lens .... 2	.85	
10-1796—Carburetor, Marvel ... 1	20.00		1299877—Piston, clutch control 6	.60		1304763—Bat. to switch cable 1	1.00	
A-18691—Carb., Stromberg. ... 1	22.00		1299541—Internal gear, R. unit, front .....	1	6.00	1304770—Bat. ground cable. 1	.60	
1861477—Choke thermostat. ... 1	.60		1299512—Carrier assem., R. unit F. pinion .....	1	15.00	Body and Sheet Metal		
1521854—Fuel pump, exch. ... 1	2.50		1299502—Carrier assem., R. planet .....	1	14.00	(4 door sedans) (in prime)		
1303580—Inlet manifold .....	1	7.25	3207—Rear bearing 1 .....	1	4.60	1303685—Front fender, L. ... 1	24.00	
1298001—Exhaust manifold. ... 1	8.00		Universals			1304027—With well, L. .... 1	27.50	
1304457—Muffler .....	1	6.00	1302132—Joint assem., front 1	8.00		1302807—Rear fender, L. ... 1	11.70	
1302386—Tail pipe .....	1	1.95	*1303239—Joint assem., front 1	8.00		1304187—Hood top panel, L. 1	10.00	
1302867—Exhaust pipe .....	1	2.10	1303474—Trans. flange .... 1	2.75		1304193—Hood side panel, L. 1	4.25	
Engine Gaskets			1288617—Front yoke, spline. 1	3.00		4084348—Cowl & dash panel 1	71.50	
1288697—Carb. to mani. .... 1	.30		1288618—Cross .....	1	1.50	4081958—Cowl vent, seal ... 1	.50	
495390—Exh. pipe flange ... 1	.10		1288619—Cross bushing .... 4	.20		4083254—Door, stripped, L.F. 1	27.50	
1399499—Mani. to block, set. 1	.50		1303033—Ball housing .....	1	3.75	4083256—Door, stripped, L.R. 1	27.50	
1283612—Inl. to exh. mani. ... 1	.10		1301439—Ball bushing .....	1	.85	4084417—Door pillar, L. cen. 1	7.50	
1303962—Cylinder head .....	1	1.25	1239001—Ball packing .....	1	.20	4083693—Roof panel, metal. ... 1	44.00	
1300926—Oil pan .....	1	.45	1295079—Propeller shaft ... 1	14.00		4083698—Trunk lid .....	15.00	
1305044—Timing case seal ... 1	.10		Rear Axle			4082733—Door glass regltr., L.F. .... 1	1.75	
1266803—Timing case cover. 1	.18		1302177—Housing .....	1	27.50	4075016—Door remote cntrl., L.F. .... 1	.40	
1296224—Valve side plate ... 1	.30		1302796—Cover .....	1	1.50	4082717—Door sill, L.F. .... 1	1.20	
1266796—Valve rocker cover 1	.25		1302798—Cover gasket .....	1	.15	4082697—Door, lock handle. 1	4.50	
1271686—Water outlet .....	1	.05	1396402—Diff. with ring & pinion .....	1	50.00	1394449—Running board, L. 1	12.50	
1285783—Pump to cylinder. ... 1	.02		*1302174—Differential case. 1	8.75		1303705—Run. brd. bracket, L.F. .... 1	.60	
1266924—Water pump cover. ... 1	.03		968297—Differential pin .... 1	.75		1304726—Run. brd. mould. ... 2	.90	
Engine Parts			Miscellaneous			1304381—Front bumper .... 1	17.50	
1394468—Block with pistons, pins and rings ... 1	125.00		1304326—Hand brake cable. ... 2	2.75		1304427—Rear bumper .... 1	19.00	
1303699—Cylinder head .....	1	40.00	1304781—Hand brake lever. ... 1	2.25		Miscellaneous		
1303249—Oil pan .....	1	8.50	5450070—Master cyl. cup ... 1	.20		5300850—Master cyl. boot ... 1	.35	
1303623—Crankshaft .....	1	70.00	231432—Secondary cup .....	1	.20	5301083—Wheel cyl. cup, F. ... 4	.20	
1297903—Camshaft .....	1	20.00	5450213—Check valve .....	1	.20	231333—Wheel cyl. cup, R. ... 4	.20	
1394444—Vibration damper. ... 1	7.50		5300850—Master cyl. boot ... 1	.35		5450031—Wheel cyl. boot ... 8	.15	
1304331—Flywheel .....	1	15.00	5301083—Wheel cyl. cup, F. ... 4	.20		1303283—Chassis frame .... 1	85.00	
1267062—Flywheel gear .... 1	3.00		5450031—Wheel cyl. cup, R. ... 4	.20		*For cars with self-shifting trans- missions.		
1394421—Piston & pin .....	8	4.60						
1304895—Compression ring. ... 8	.35							
1299136—Compression ring. ... 8	.35							
1280657—Oil ring .....	16	.60						





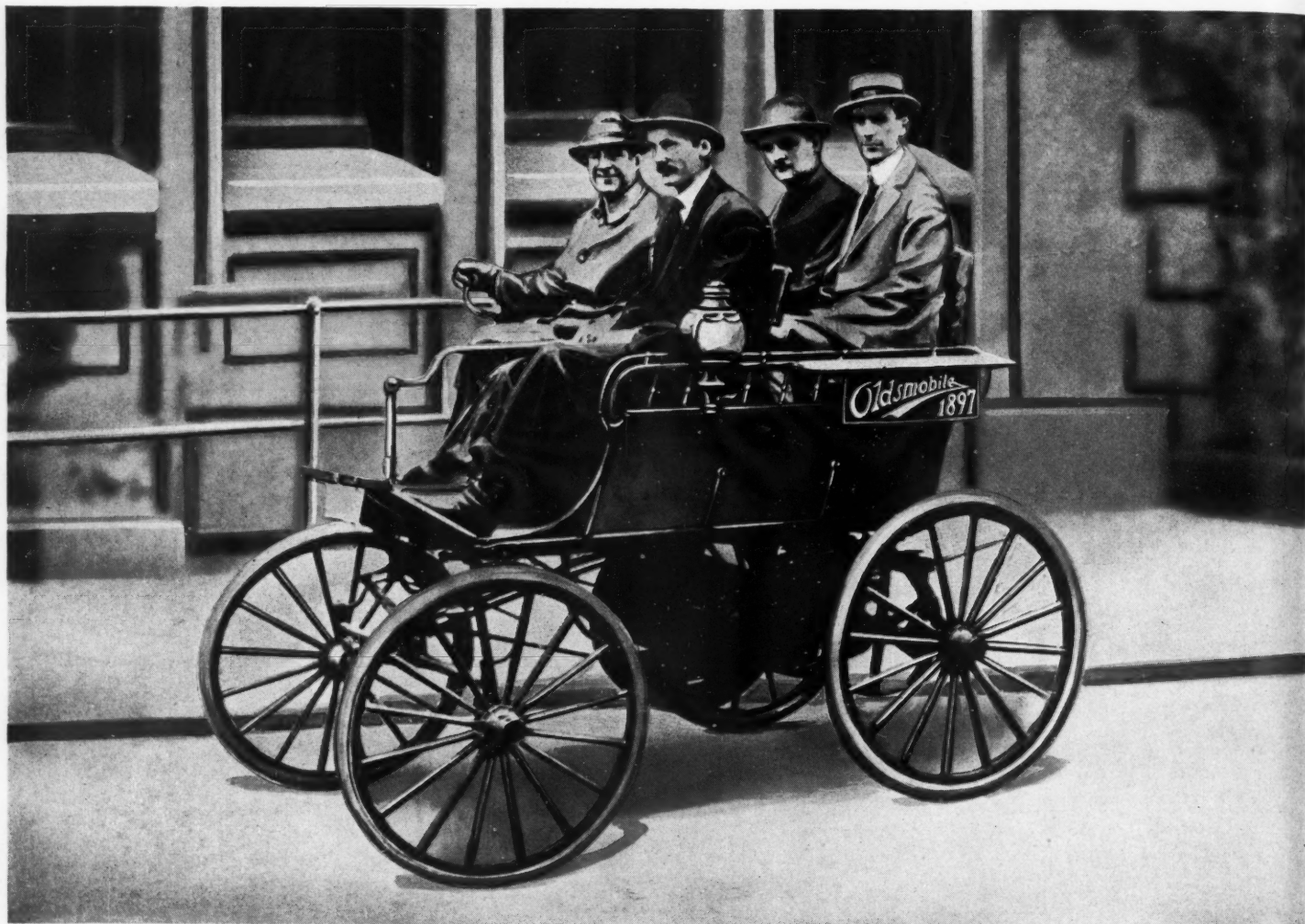
# LIFE

COVERS THE AUTOMOTIVE MARKET

# LEADING AUTOMOTIVE ADVERTISERS RELY ON THE LIFE FORCE TO BOOST SALES

Because *Life* concentrates most of its circulation in America's big-spending families, spenders of 65 cents out of every dollar the entire United States pays for car, accessories, and service. *LIFE* families use their automobiles, drive them an average of nearly 14,000 miles a year, constantly are needing and buying the automotive products they see advertised in *LIFE*, the magazine

they like. One of the things *LIFE* gives them is a lively interest in auto travel. *LIFE*'s articles on points of interest in America have stimulated car mileage. Its traffic story (see front cover) has been hailed by automotive men, federal and state traffic officials, from coast to coast. Thousands of copies of this story have been distributed to the motorists of this country through automotive advertisers.



Oldsmobile Motor Div., General Motors Sales Corp.

## WHEN THE "HORSELESS CARRIAGE" WAS NEW-FANGLED

This Oldsmobile of 1897 steered with a horizontal bar, used high-priced, high-pressure bicycle tires, caused many a runaway when its reckless speed of 15 miles an hour scared horses. America's greatest industry today is the automotive industry. Oldsmo-

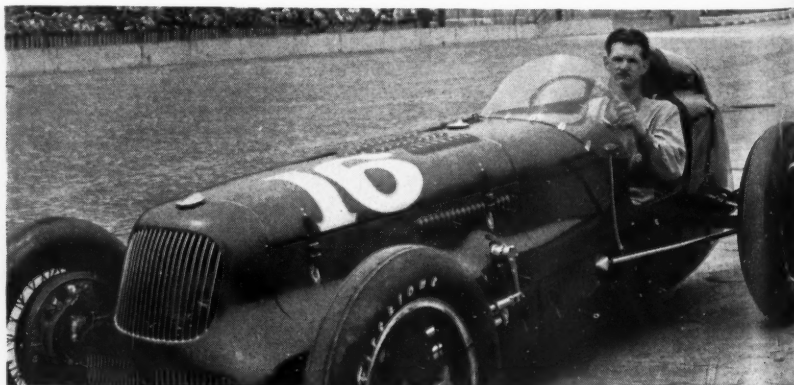
bile, once the pioneer this picture shows, now a member of the General Motors family and a *LIFE* advertiser, looms large in the most important story of our century. It is hard to imagine that automobiles, today so such a part of this "nation on wheels", were

once so rare that popular songs were written about them. (Your grandfather sang about "me and Lucille, in my merry Oldsmobile".) Oldsmobile's growth, in four decades, strikingly illustrates how the whole automotive industry has zoomed upward in a generation.



## MILLIONS OF MILES

One of the many pictures in *LIFE* which stimulate car owners to go places, adding millions of miles to the speedometers of the nation's automobiles.



Pyroil Co.

## RECORD-BREAKER

**500 Miles to Fame and Glory** is the lure that draws the world's crack racing drivers to the Indianapolis Speedway for the Memorial Day grind. The "protective film" of Pyroil, advertised in *LIFE* by the Pyroil Company, helped protect the motor of Ronney Householder, who this year broke all-time qualifying speed records at Indianapolis by thundering through at 125.769 miles an hour.



# NINE OUT OF EVERY TEN LIFE FAMILIES OWN AUTOMOBILES



International Harvester Co., Inc.

## FROM WELL TO PUMP

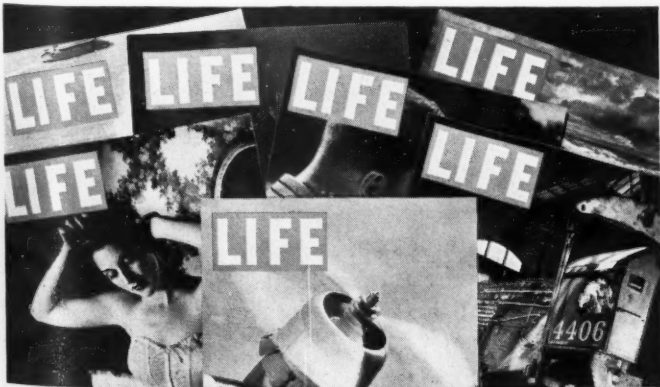
Dependent on efficiency, the great oil industry uses many sturdy International Trucks, made by the International Harvester Company, a LIFE advertiser.



RCA Mfg. Co., Inc.

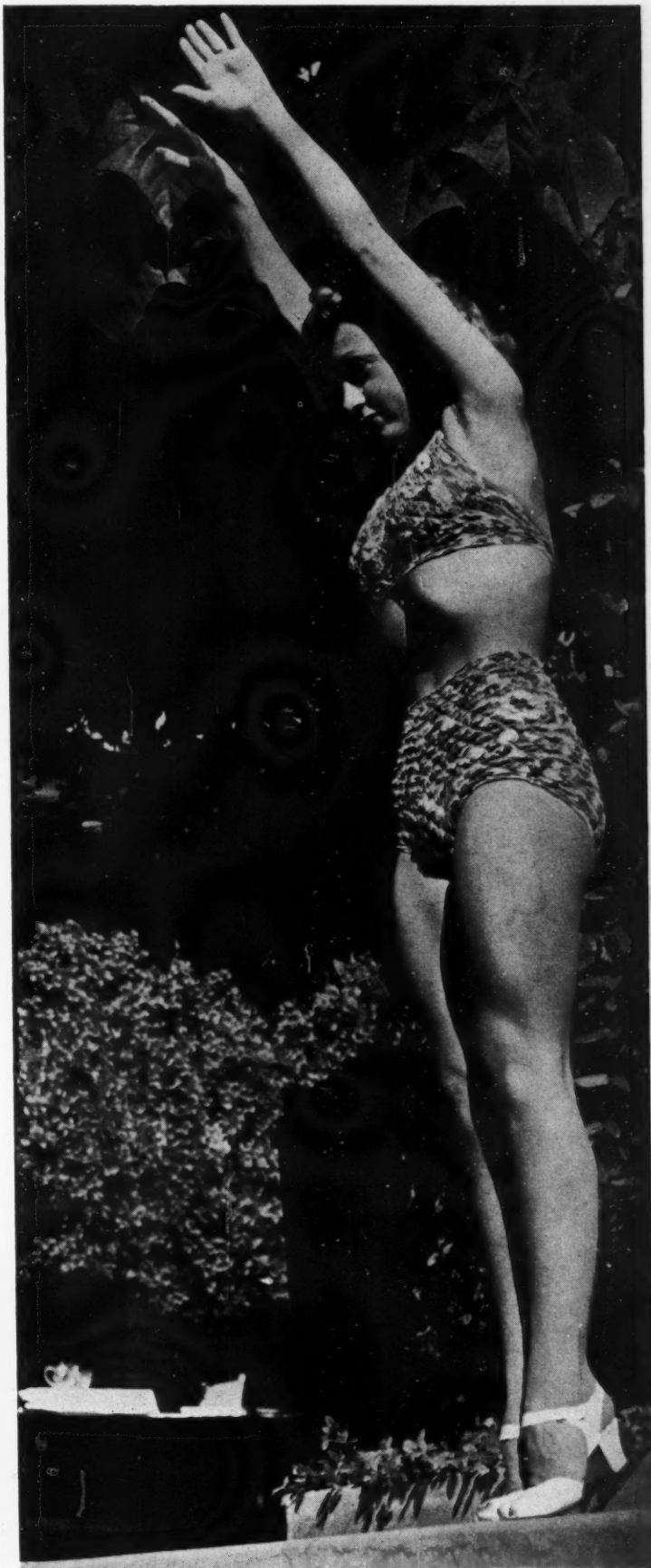
## RCA AUTO RADIO TAKES FANS TO BALL GAME

Fans back home listen as home-town boy, newest pitching sensation in Big Leagues, hurls team to victory. Clustered around new RCA Victor Auto Radio, they grow delirious with delight at local lad's doings. RCA advertising runs for several pages in LIFE each month, is titled "Listen", the "magazine within a magazine".



## LIFE BEST-READ MAGAZINE AMONG CAR DEALERS

2384 men, dealers in 12 leading makes of U. S. automobiles, were asked in which of four large weekly magazines they were most likely to read what is on every page, including the advertisements. LIFE was the winner. When filling station operators were asked the same question, LIFE again came out first. Thus dealers in the automotive industry know from first-hand experience why the most widely read magazine in America is such an excellent advertising medium.

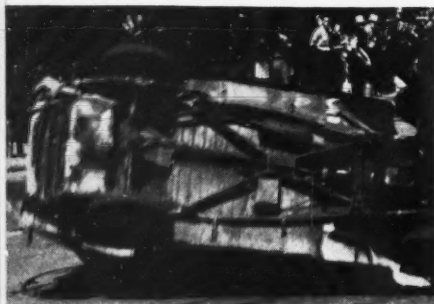
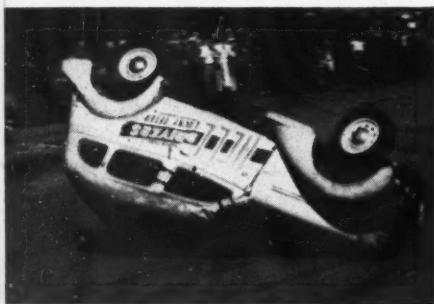


The Electric Auto-Lite Co.

## MOVIE STARS ON PARADE

Bright star is Danielle Darrieux, the French movie actress brought to America by Universal Pictures. Her glamorous face and figure are one of the alluring attractions of the "Parade of Stars", new advertising campaign for Auto-Lite Spark Plugs in LIFE.

## "LUCKY" TETER DEFIES DEATH



*Plymouth Div. of Chrysler Corp.*

"Hell drivers" is the picturesque name by which "Lucky" Teter and his daredevil stunt drivers are known to county fair and city exposition crowds. Using Plymouths, manufactured by the Chrysler Corporation, a LIFE advertiser, Teter and his troop turn their cars over at sixty, sail through the air, crash unhurt through board walls. To Teter in five years of exhibitions have come few bad accidents, no punctures.

# THE WHOLE FAMILY READS LIFE



"America's most popular magazine". Surveys show that 95% of all the members of LIFE families read it regularly. Further revelation: that they read every page of every issue. Automobile advertising in LIFE reaches the entire family, can produce notable results because buying a car is a family matter.



*The Texas Co.*

## EXPERT HELP RUSHED TO MOTORISTS

Many a traveler has had reason to thank the Texaco Touring Service Bureau for help in planning a pleasanter trip. Dealers refer autoists' requests to the Service Bureau, where experienced men map out the best routes and speed this information back by air mail or wire if necessary. Texaco dealers, who, with Texaco's Registered Rest Rooms and Touring Service, are featured in LIFE advertising, thus insure sales by giving service.





*De Soto Div. of Chrysler Corp.*

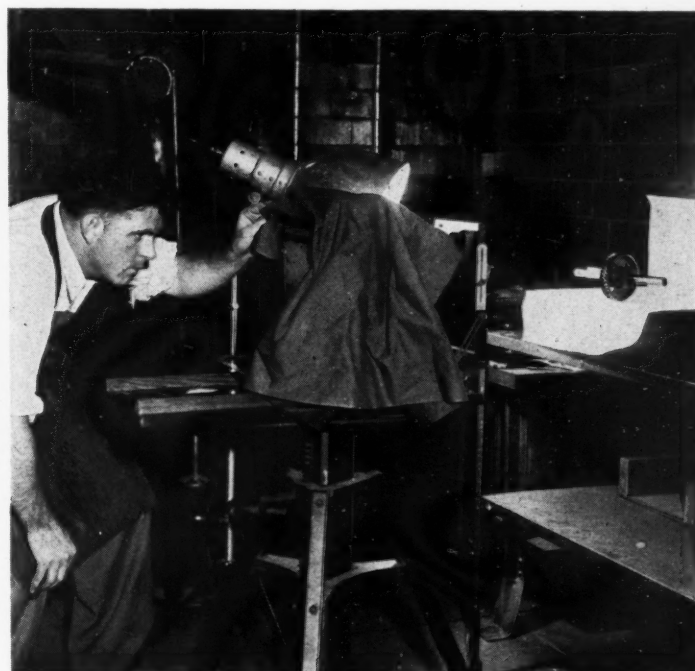
Deanna Durbin might be singing an old time song, "Sipping Sodas through a straw". Seen here with her discoverer, Eddie Cantor, the famous comedian, this sensational young radio singer is thoroughly enjoying herself on her first visit to New York. Both Deanna Durbin and Eddie Cantor are featured in the LIFE advertising of De Soto Automobiles, manufactured by the Chrysler Corporation.



*The General Tire & Rubber Co.*

### CHANGING TO GENERAL

Automobile tires were once iron tires on wagon wheels. By 1914, American cars were using 3½-inch rubber tires inflated at 80 pounds, solid tires, almost. In 1923 came "balloon" tires, in whose introduction The General Tire & Rubber Company, a LIFE advertiser, played an important part.



*Socony-Vacuum Oil Co., Inc.*

### "NOW SMILE!"

In Socony Vacuum's Paulsboro, New Jersey, laboratory, E. J. Woods photographs an engine part. This is everyday stuff in the big job of testing lubrication effects on all parts of the motor. Socony Vacuum Mobiloil and Mobilgas are advertised in LIFE.

# 18 MILLION AMERICANS READ LIFE EVERY WEEK



Ethyl Gasoline Corp.

## A MILE A MINUTE STANDING STILL

This car is running on a dynamometer at one of the nation-wide clinics of the Ethyl Gasoline Corporation, who feature in LIFE "Three Grades of Performance with Three Grades of Gasoline". The machine proves that high-grade gasoline gives better performance than poor gasoline under all conditions, especially tough conditions.



## WOMEN LIKE LIFE

Sonja Henie, 20th Century-Fox star, shown here with "Buddy" Ebson and Richard Greene is no exception to the rule that women love LIFE. Important to advertisers is this additional truth: women boss the purchase of most of America's automobiles. By actual count, 95 out of every 100 adult women members in LIFE families read every issue of America's picture magazine. Automotive advertisers have found that advertising in LIFE pays extra rich rewards, because LIFE reaches women.



Plate Glass Mfrs. of America

## SAFETY FOR A SMILING CHILD

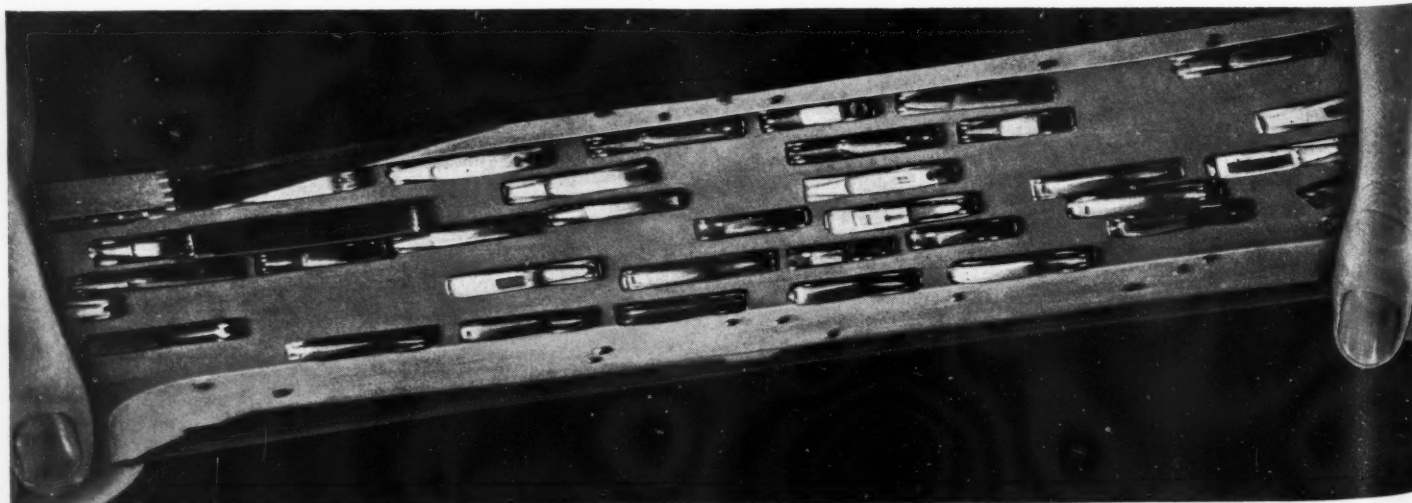
Your eyes tell the truth when you look through Safety Glass made from Plate Glass, as advertised by the Plate Glass Manufacturers of America in LIFE. Besides giving greater protection to car occupants, this Plate Glass, free from the "waviness" in ordinary window glass, increases riding and driving pleasure by decreasing eye-strain to a minimum. See the trade-mark down near the little lady's doll? It is etched on the glass by sand-blasting.



Chevrolet Motor Div., General Motors Sales Corp.

## CHANGING AMERICAN LIVING

Offering the public a beautiful car at a price has really revolutionized American living. At the turn of the century, the average man would not have dreamed of owning such a car as this Chevrolet, even if such a car existed. Advertisements for Chevrolet, biggest-selling automobile in eight out of the past eleven years, are to be seen frequently in LIFE.



## STRETCHING A MILE

Shell Petroleum Corp.

When is a mile not a mile? When it's Stop-and-Go driving, is the answer in Super-Shell advertising, appearing regularly in LIFE. It's the extra revolutions your engine makes in shifting gears that stretch your miles. Shell's "trick" photographs, made by a brand-new process, effectively illustrate the advertising story.





The Studebaker Corp.

### FROZEN STUDEBAKER

In a room colder than Admiral Byrd's Little America, a mechanical blower whips up a 50-m.p.h. wind, coats and cakes this Studebaker with ice, tests the stamina of these automobiles whose proud ancestry goes all the way back to sturdy prairie schooners which carried pioneers to California. Studebaker's forceful advertising in LIFE tells a striking story.



Tide Water Associated Oil Co.

### SKELETON GIVES IDEA

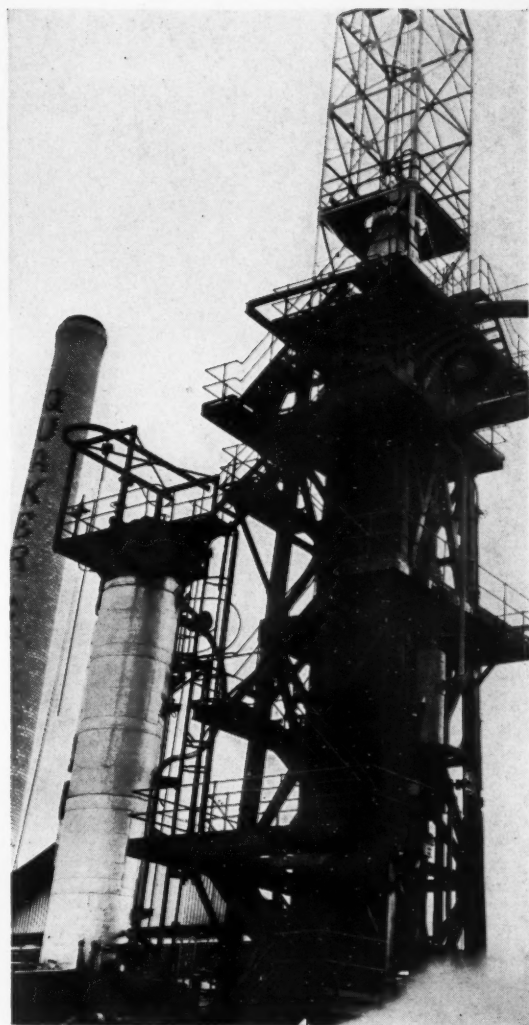
Model sits for artist John Atherton, who drew the arresting "human skeleton" illustrations used by Tide Water Associated Oil Company last Spring to advertise its Veedol Motor Oil in LIFE. Artist Atherton has no difficulty in getting his models to pose willingly, says they never get tired, insists that he is probably the world's only illustrator of humans who buys his models outright.



B. F. Goodrich Co.

### ROCHELLE HUDSON AND FRIEND

Largest tire ever built for a commercial airplane is this giant being inspected by film star Rochelle Hudson. This 65-inch tire is for the new Douglas 42-passenger transport, largest passenger land plane . . . its maker, the B. F. Goodrich Company, a LIFE advertiser.



Quaker State Oil Refining Corp.

### OIL: 1859-1938

Modern oil equipment in Oil City near Titusville, Pennsylvania, where America's first oil well was drilled in 1859. Nowhere else in the world has crude oil been found with its particular lubricating characteristics. Quaker State Oil Refining Corporation, of Oil City, Pennsylvania, a LIFE advertiser, has devoted over half a century to the scientific development of this crude oil. "Acid-Free Quaker State Motor Oil" is this advertiser's contribution to motoring.



Champion Spark Plug Co.

### MIDGET RACERS, MIGHTY THRILLS

It's an old story for Johnny Ritter, midget racing car driver, to see the flash of the checkered flag that shows he has won another race. Johnny has thundered to victory on tracks all over America. Sometimes his bucking "half pint" gives him a bad spill, but if it's in soft dirt, as here, he somehow manages to get out unhurt. Champion Spark Plug Company points out in LIFE advertising that its Champion Plugs furnish the terrific split-second acceleration that makes these midgets mighty.



Every 1000 Life families own 999 Automobiles. Almost nine out of every ten LIFE families own a car, and nearly 15% of them own more than one car.



*The Crosley Radio Corp.*

### ROMANCE, 1938 MODEL

**Modern Romance** calls for a car equipped with a good radio set. The moon helps make the magic, and music makes the mood. The Crosley Radio Corporation has given an appropriately romantic name, Roamio, to its Auto Radio advertised in LIFE.



*Kelly-Springfield Tire Co.*

### CARTOONIST DRAWS HIMSELF

**Don Herold, famous cartoonist**, is his own model, he says, for those characteristic Don Herold figures that illustrate the advertising of the Kelly-Springfield Tire Company in LIFE. Herold's funny little gnomes scoot through his stories of interesting trips through the Kelly-Springfield factories.



*The Shaler Co.*

### SALES MANAGER SPEAKS

"In my travels by plane and rail into almost every state in the Union during the past year, I noticed that readers thumb every page of LIFE from cover to cover," reports W. S. Coles, Sales Manager of The Shaler Company, whose Rislone "break-in" oil and other products are advertised in LIFE's pages. "This is a clear indication that an advertisement, regardless of its size, does not go unnoticed."



### LIFE TOPS THEM ALL

**More people read Life than any other magazine.** Every copy of LIFE averages over 8 readers. Everybody in the family reads LIFE, family guests read it, neighbors borrow it. Advertising in LIFE influences the decisions of 18 million Americans, who form America's most profitable automotive market. Here LIFE has given you some human interest glimpses into the doings of those leading automotive advertisers who have discovered that LIFE advertising pays.



# Why we spend real money to tell your customers that "every car has 3 grades of performance"

**W**HEN you sell gasoline you're really not selling just so many gallons of liquid. You're selling miles of driving and car performance. That's why the *grade* of gasoline you sell is so important. The performance of your customer's car depends on that gasoline...and the correct setting of his spark.

*We believe that the best way to improve your gasoline business is to make more satisfied motorists. That's why every Ethyl advertisement this year tells these important facts:*

1. The farther the spark of a modern car is advanced, up to the point of maximum performance, the more power you can get.
2. The spark can't be advanced any farther than the anti-knock quality of the gasoline permits...without "knock" or "ping."
3. Because there are *three* grades of gasoline there are naturally three grades of performance in every car. These three grades of performance are:



## *Poor performance with "low grade" gasoline*

There is no anti-knock fluid (containing tetraethyl lead) in "low grade" gasoline. Power is lost because the spark must be retarded to prevent "knock" or "ping."



## *Good performance with "regular" gasoline*

Most regular gasoline has in it anti-knock fluid (containing tetraethyl lead). The spark can be considerably advanced for more power without "knock" or "ping."



## *Best performance with gasoline containing "ETHYL"*

Gasoline "with ETHYL" is highest in all-round quality. It has *enough* anti-knock fluid (containing tetraethyl lead) so that the spark can be *fully* advanced for maximum power and economy without "knock" or "ping."

Our advertising makes it easier for you to sell your customers better grades of gasoline. It helps your customer to get better results from his car. That's why you—as well as the Ethyl Gasoline Corporation—benefit from every cent spent to put the facts about gasoline and performance before the public.

**ETHYL GASOLINE CORPORATION**, manufacturer of anti-knock fluids used by oil companies to improve gasoline

MOTOR AGE, September, 1938

When writing to advertisers please mention Motor Age

## 20 Ring Jobs

(Continued from page 23)

We do lots of valve jobs and do not attempt to sell rings, where a car, in our estimation, does not need them. Many times we find a carbon cleaning job necessary to a proper tune up. This happens numerous times on cars with ten to fifteen thousand miles on the speedometer.

"We do not always sell everything needed on the job before we get the car in, but as the work progresses, we find the average car owner is not averse to spending a little more for needed additional parts if you can

definitely show him in understandable English why it is necessary to do so.

"When an owner comes in for a valve job on cars that have in the neighborhood of 25,000 miles on the speedometer we attempt to sell a ring job as well, even though the car does not use oil. Just because a car does not use oil does not necessarily mean the rings are perfect. Excessive loss of compression can take place and still not use oil. The principle of the ring is explained to the customer, how it has two definite functions, to control oil and to control compression, by its outward tension against and its conformity to the wall. How can one expect to have definite continued improvement in a motor by grinding

the valves when he's losing just as much power by the rings. Our ring jobs will average 20 sets a month. Our engine tune up jobs average six a day, brake adjustments, 15 a week. Brake relining jobs, five a week, valve jobs, six a week.

"We have always relined brakes, whenever a job presented itself, but a year ago we decided to definitely do complete brake jobs. By complete I mean drum truing, installing grease retainers, brake lining repacking, wheels and bearings, etc. We bought a lathe and all the necessary parts requisite to doing a first class job. Today we sell more brake lining than any dealer or garage in this territory. Additional revenues of profit were opened up in the sale of grease retainers and wheel bearings. Slightly over 1200 brake drums were trued in a year.

"How many garage men put back brake drums slightly scored or out of round? How many think to sell grease retainers on every job, not only for the customer's benefit, but for his own protection against comebacks? Again, all necessary things are done to do a good job. Results—satisfied customers who long remember a good job, overlook the little additional cost, and bring in more customers.

"A little over a year ago, we thought we would make our shop more complete by the addition of a body and paint shop. Today by carrying out the same idea, of a complete job, we employ five body men and a painter. The paint shop is a separate room built within the main shop, well ventilated and lighted and equipped. The body shop has every available piece of equipment necessary to a good body job.

"On carburetor work we carry a complete stock of parts and gaskets. Our jobbers tell us we use more parts than anyone in Salt Lake. Again, how many garagemen clean a carburetor without completely dismantling and checking the various parts for changes made by the manufacturers, replacing improper and worn parts, re-calibrating the carburetor by correcting float levels—metering pin settings, anti-percolating devices, etc.? All have their particular and necessary function to perform. Each one, if not right, affects the operation of the car in its own way. The motor eager to go to work, but can't because someone somewhere hadn't the ability, foresight or aggressiveness to sell a much needed item."

### Motor Parts Corp. Changes Hands

Effective Aug. 1, ownership and active management of the Motor Parts Corp., Omaha, Neb., was assumed by Morris J. Murphy and Alvin C. Brown. Mr. Murphy is now president and treasurer of the organization, while Mr. Brown is vice-president. They succeed Mr. John R. Piper in ownership of the corporation.

The Motor Parts Corp. is one of 38 warehouse members of the National Automotive Parts Association, nationwide automotive parts warehousing and distributing organizations, with headquarters in Detroit, Mich.



**K-D** has the call for Fall when longer hours of night driving make more lights and *better* lights imperative. K-D products are backed by K-D Quality which is kept up to such lofty standards that they exceed S.A.E.-I.E.S. specifications and pass every test with a big plus margin.

Write for the handsome K-D CATALOG No. 38—it's a cyclopedia of the best lamps made—just off-the-press illustrated "from life."

### K-D SHO-TURN

Direction Turn Signal



MODEL No. 565-B



MODEL No. 565-D



MODEL No. 565-A

Members by invitation . . . Rice Leaders of the World Association







## Dealers report Willard's new "H-R" is the fastest selling battery they've ever seen!

● It's the HOTTEST thing in years! Repeat orders for the "H-R" are rolling in—in hundreds of cases first shipments are "sell-outs."

Already car owners have created an amazing demand for this "power-house" battery—this new Willard that lasts 68% longer than the average of 100 other brands, including all the best known makes.

Unusual? Sure—because the battery selling season is scarcely started. When Willard's highly organized and carefully timed campaign hits its peak this Fall the dealers who stock the new "H-R" will reap a tremendous sales harvest.

If you act quickly—you still have time to get your share. Write today for details of the Franchise that will give you the "hottest" battery in years!

**WILLARD STORAGE BATTERY COMPANY**  
Cleveland • Dallas • Los Angeles • Toronto

**The Willard Franchise is more than just a good battery!**  
**PROOF? . . . Year after year, more dealers make more money with Willard!**

## NO WONDER IT'S A SENSATION!

It's new. Exclusive Willard features enable the "H-R" to give remarkable performance—make it a real "power-house."

It's advertised. Millions of hard-hitting ads in a dozen magazines are telling America about the new "H-R." See the big double-page ads now in the *Saturday Evening Post* (Aug. 13, Sept. 3, and Oct. 8 issues).

It delivers the goods. 78,000 case histories, representing 1½ billion miles of service prove that the Willard "H-R" will last 68% longer than the average of over 100 other brands, including all the best known makes.

It brings larger profits. At its full markup, the new "H-R" sells faster than cut-price batteries. More sales multiplied by more profit on each sale means a real money-making business for you. Why not get some of it? . . . **WRITE US NOW!**

## Brakes

(Continued from page 19)

substitutes for commonly used brake-lining materials was begun by the group that was later to become the Raybestos Company. Indestructibility was the end sought. Heat and erosion had to be rendered ineffective. Attempts to make cotton tape fireproof or heat resisting by introducing ammonium salts, tungstates and other chemicals met with little success.

It was in 1905 that asbestos was first used and lining made from it was supplied to cars then in production. What machinery there was at that time for spinning and weaving

asbestos yarn was crude and undeveloped. There was little general demand for products made in that way. But necessity again showed its fecundity and the needed machines were progressively designed and gradually put to work.

As service men know, the early woven asbestos brake lining, because of the weakness of asbestos fibre, had in it two strands of copper wire .008 thick to each three strands of asbestos yarn. Today, woven linings without the wire are extensively used, the asbestos being reinforced by strands of cotton hemp or linen treated with a synthetic resin which keeps them from charring. Molded linings came in with the general use of internal ex-

panding brakes about 1925. It is a long jump from leather lining of the days when I took the tour herein described to the marvelous woven and molded lining which we have now. It's a long jump if you look at it that way. But, actually, it wasn't a jump at all. It was a long, hard climb.

Who can question the statement that the development of the high-speed, reliable and safe cars we have today would have been impossible except for the work which these pioneers in brake lining development did so well. No car of any vintage is better than its brake-lining.

Beside maintaining large laboratories for research and experimentation, Raybestos also has, for many years, conducted a school for brake mechanics. Thousands of men have passed through it and thus fitted themselves to render better brake service.

Raybestos grew and grows through persistence in striving for high quality in its product. Constant research is supplemented by close cooperation with the engineers of the car manufacturers to adapt linings to the requirements of the cars and brakes.

From the small company which made a better brake that needed a better lining, the Raybestos organization has expanded under the able leadership of the men who now guide it, to the present Raybestos-Manhattan, Inc., which, with Sumner Simpson as president, comprises the Raybestos Division of Bridgeport, Conn., the Manhattan Rubber Manufacturing Division of Passaic, N. J., the Manhattan Rubber Manufacturing Company of Neenah, Wis., the United States Asbestos Division of Manheim, Pa., the General Asbestos and Rubber Division of Charleston, S. C., the Canadian Raybestos Co., Ltd., of Peterborough, Ontario and the Raybestos Belaco, Ltd. of England.

In the need for a better lining for a better brake, which was marketed first in the very early 1900's; under the American System of Free Enterprise, which this country has enjoyed for 150 years, there proved to be a gold mine of opportunity and better living for thousands on thousands of men who work. Millions on millions of dollars have been paid out of that gold mine in wages during the past 30 years.

And so it goes when individual initiative is given free rein, when men, equal to the task, are allowed, without onerous restraint, to create new products to meet new demands, to build businesses which make more jobs and raise the standard of living for many. The story of American Enterprise is told again and told dramatically in the history of Raybestos-Manhattan, Inc.

### Howard S. Cook to Pylac

Howard S. Cook, advertising and merchandise manager for the past nine years with John T. Stanley Company, has severed the connection and will henceforth be associated with Pylac Products Company, Belleville, N. J., manufacturers of a radically new auto wash.

Complete advertising and merchandising schedule is planned for Pylac in the very near future.

## Equip your Shop to handle work more efficiently!

YOU CAN DO IT EASILY AND ECONOMICALLY WITH . . . . .

### "HALLOWELL" Lifetime EQUIPMENT



Fig. 992

#### "HALLOWELL" Semi-Portable WORK-BENCH OF STEEL

A great Favorite in Automotive Repair Shops. In a way it suggests a wheelbarrow; grab the handles and trundle the "HALLOWELL" around anywhere. Let go, and it lands on its plain feet, when it becomes a perfectly steady work-bench. Handles swing down and out of the way when not in use, and to prevent shimmying the casters do not swivel. Write for Bulletin.

#### "HALLOWELL" STEEL WORK-BENCH

Strong, rigid, with one piece, smooth steel top, easy to keep clean. Of welded construction, they can't get wobbly—and can't splinter or burn. Best of all, they're inexpensive. Of the 1368 types and sizes, there's one made exactly for you. Bulletin gives details.



Fig. 732  
Pat'd. and  
Pat's. Pending  
Drawer is extra.

#### "HALLOWELL" STEEL TOOL STANDS

A Stand that can be locked, yet is always open for inspection as to its contents. Portable—able to be moved from job to job—wherever it's required! No wonder hundreds are used in the motor industries. There's a type for every purpose.

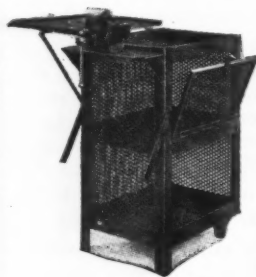


Fig. 1112

#### "HALLOWELL" STEEL BENCH DRAWERS

Can't shrink, swell, stick or jam. Wears far better, lasts much longer than wooden drawers. Has dirt and dust proof cover, and convenient tray for small precision tools. Get Bulletin.

## STANDARD PRESSED STEEL CO.

### BRANCHES

BOSTON  
DETROIT  
INDIANAPOLIS

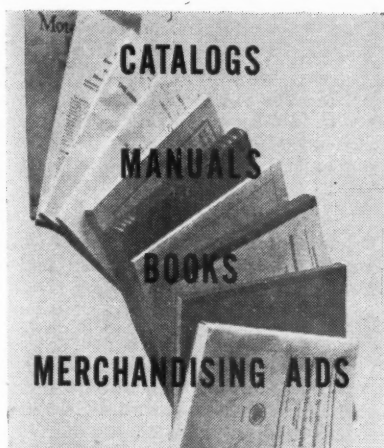
### JENKINTOWN, PENNA.

Box 561

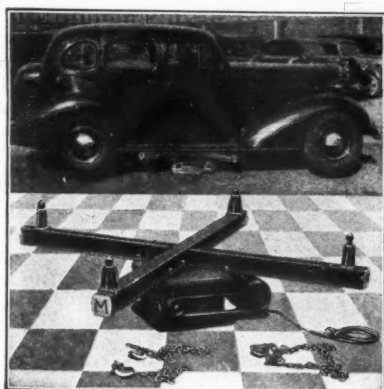
### BRANCHES

CHICAGO  
ST. LOUIS  
SAN FRANCISCO



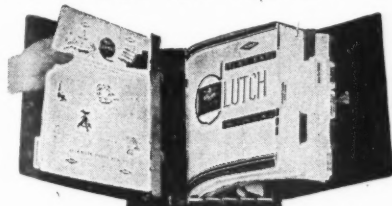


A new revolving display stand has been announced by the Manley Mfg. Division of American Chain & Cable Co., Inc., York, Pa. Silent and efficient in operation, the stand is easily set up and requires no special care.



The revolving speed is one revolution per minute. Adjustable jacks located on top of cross members permit perfect adjustment and positive four point contact on frame of car. For complete information and prices, write the manufacturer.

The Accurate Parts Mfg. Co., 12435 Euclid Avenue, Cleveland, Ohio, is offering its jobbers at cost an all-metal, always open, indestructible catalog binder, containing full and complete finger-tip information on how



to assemble, disassemble and service all types of clutches. It also contains parts price sheets, flat rate manual, technical bulletins and other information, identified with celluloid tabs. Space is provided for inserting other important shop information.

A new catalog has been issued by Skilsaw, Inc., 3310 Elston Avenue, Chicago, Ill., covering their complete line of electric saws, drills and grinders.

The Aluminum Company of America has just published a manual on

the subject of welding aluminum. It covers in detail the selection of tip sizes for fusion welding, gas pressures used for different thicknesses of aluminum, and discusses the different types of welding that can be applied to aluminum. The technique of welding aluminum is somewhat different from that required with steel, cast iron and other metals, but is not difficult to acquire. Tips on flame adjustment, the use of flux, the choice of welding wire and the necessity for pre-heating under certain conditions are all carefully and completely discussed. The welder will find this manual of considerable assistance to him


in any class of aluminum welding in which he is engaged.

### Goad Appointed AC Head

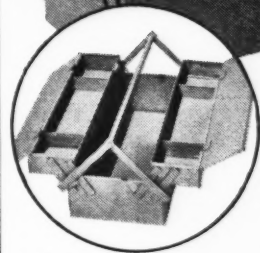
Appointment of L. Clifford Goad as general manager of the AC Spark Plug division of General Motors has been announced by Alfred P. Sloan, Jr., chairman of the board of General Motors Corporation.

One of the youngest general managers in the ranks of General Motors, being only 37, Mr. Goad succeeds Fred S. Kimmerling, who has been on leave of absence since last September because of ill-health

**Free!** with your next order of Johns-Manville Brake Lining...



**The most practical TOTE BOX you've ever seen!**



■ You've never seen a tote box to beat this one. Made of heavy metal, it's designed to stand hard service for years. Automatic in action, it opens when you put it down, closes when you pick it up. Size, 17" long by 8" wide and 6½" deep. A regular \$4.00 value!



■ Purchase of this Special Deal No. 2 is just one of the many ways you can get your tote box free. This Deal includes the 17 most popular sets in J-M's 4-Star Line and an electrically illuminated display cabinet. With this stock of lining you can service 80% of today's passenger cars.

**YOU'LL** want to get in on this Johns-Manville Deal fast! You benefit in two ways. First, you get the satisfied customers that the economical, dependable J-M line assures every time. Second, you get this handy tote box . . . *absolutely free!*

This box is a honey. Made of heavy-gauge metal, it's built to stand long, hard wear. It holds all the tools you need for the average emergency service job. And it's automatic . . . opens when you put it down . . . closes when you pick it up. It makes your job easier every time you use it!

Here's what you do to get it: Send in just one order for J-M Brake Linings or Clutch Facings totaling \$92.50 list . . . you get your full discount. That's all—the tote box is yours at no extra cost!

Act now! This offer is good for a limited time only. See your J-M jobber, or fill in and mail the coupon today.

(This Offer Limited to Dealers and Servicemen only)

## JOHNS-MANVILLE BRAKE LININGS AND CLUTCH FACINGS

JOHNS-MANVILLE, 22 East 40th St., N.Y.C.

Send me complete information on your tote-box deal, and facts on the J-M Brake Lining Line.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

MA-9-38

## Modern European Racing Engines

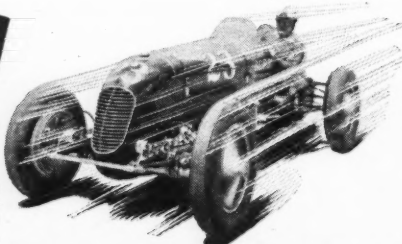
Following are brief specifications of engines of racing cars build to comply with the new international racing rules and regulations:

Make	Cyl. No., Bore and Stroke in.	Displ. per Cylinder Cu. in.	Total Dis- placement Cu. in.	Stroke- Bore Ratio	Engine Speed r.p.m.	Piston Speed ft. p. m.	H. P.	H. P. per Cu. in.
Alfa Corse	8-2.72 x 3.94	22.8	182.4	1.44	6000	3940	306	1.675
Alfa Corse	12-2.59 x 2.87	15.2	182.5	1.10	6500	3110	330	1.804
Alfa Corse	16-2.29 x 2.75	11.27	180.4	1.20	7000	3210	348	1.90
Auto-Union	12-2.56 x 2.95	15.16	182.0	1.14	6500	3190	...	...
Delahaye*	12-2.95 x 3.33	24.8	274.0	1.12	5000	2780	250	0.91
Maserati	8-2.71 x 3.94	22.8	182.4	1.44	6300	4140	350	1.92
Mercedes	12-2.63 x 2.75	15.0	180.7	1.04	7200	3310	370	2.02

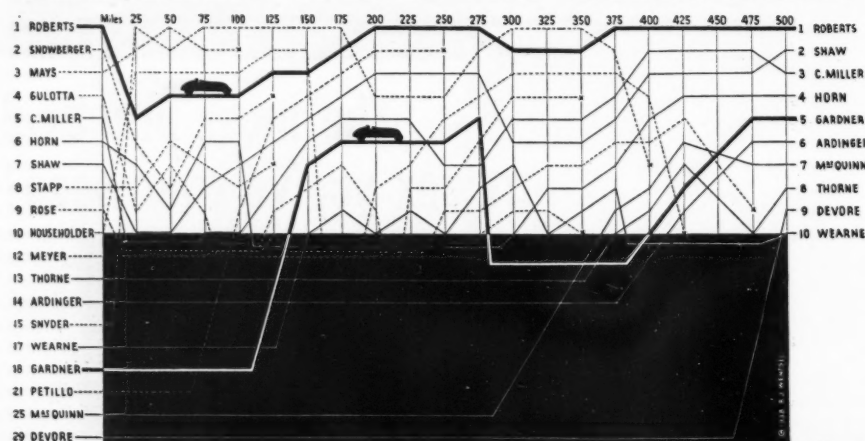
\* Without supercharger, which makes the displacement limit 274 cu. in., as compared with 183 cu. in. for supercharged engines.

## WHAT A MAN WHAT A CAR

Floyd Roberts, world's  
foremost racer in all-  
around driving skill, and  
his Burd Piston Special.



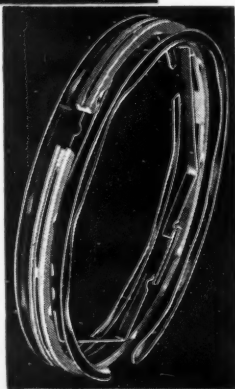
## WHAT PISTON RINGS?



### BURD "QUIK-SEAL" FEATURE HELPS ROBERTS RIDDLE RACE RECORDS!

Floyd Roberts, fastest human in all 26 years of racing in Indianapolis, refused to take chances on piston rings for the matchless mount with which he won the 1938 classic. He used Burd "Quik-Seal" compression and oil rings. ★ ★ By finishing in fifth place, despite a tough break in the pits, Chet Gardner made it 2 out of 2 Burd entries in the high half of the money. ★ ★ With the same Quik-Seal feature, the new Burd "Super Hi-Speed" rings will win friends and build business for you.

**BURD PISTON RING COMPANY, ROCKFORD, ILL.**  
Associate Co. Liberty Foundries Co.



## BURD Super Hi-Speed PISTON RINGS

LINDBLOOM VALVE PACKING • HADEES HOT WATER CAR HEATERS

ATLANTA, GA. . . 542-544 Spring St. N.W. LOS ANGELES, CAL. . . 1425 S. Flower St. ST. LOUIS, MO. . . 3225 Locust Blvd.  
BOSTON, MASS. . . 1 Brighton Ave. MINNEAPOLIS, MINN. . . 21 S. 13th St. SAN FRANCISCO, CAL. . . 540 McAllister St.  
CHICAGO, ILL. . . 2238 S. Wabash Ave. NEW YORK, N. Y. . . 549 W. 52nd St. SEATTLE, WASH. . . 1800 Boylston Ave.  
DALLAS, TEXAS . . . 2785 Canton St. TORONTO, 5, Ont. Can. . . 115 George St.  
KANSAS CITY, MO. . . 1806 McGee St. WINNIPEG, MAN. CAN. . . 120 Lombard St.

GET PROMPT SERVICE

FROM ANY OF THESE CONVENIENT BURD WAREHOUSES

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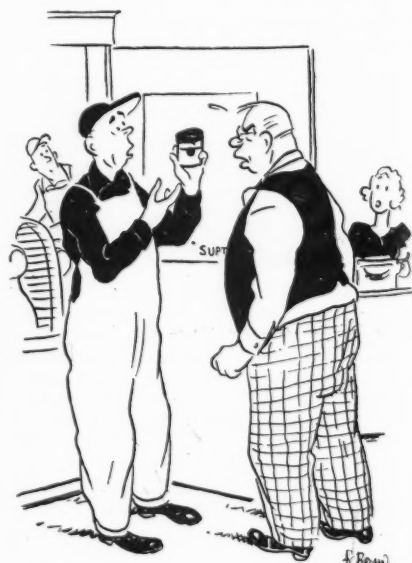
## Hub Cap Removing Tool

The Wayne Tool Co., Rochelle, Ill., has developed a new tool for removing hub caps which does the job without danger of battering the hub cap and cracking the enamel on hub or spokes. It consists of a straight handle, one end of which is fitted with a rubber cup; in the center is a swiveled hook which is fitted over the edge of the hub cap. An easy downward push on the handle draws the hub cap out of the wheel.



## Repairs Cracked Blocks

Bobro Products Co., 17 West Sixtieth Street, New York City, has announced a new product for repairing cracks in water jackets cylinders and valve ports. Known as 707 Moto-Weld, the liquid is added to the cooling system water and is said to seal cracks in ten minutes; the manufacturer claims that it will not clog the radiator or retard circulation. Packed in a case containing 12 cans, it is priced at \$2 per pint or \$3.50 per quart.



"I never said you were crazy, Mr. Withers—I said the boss was cracked!"



# ENTHUSIASTIC ★ OWNERS ★

**BUY AGAIN AND AGAIN . . . AND THEY  
KEEP SENDING NEW PROSPECTS TO  
CHRYSLER DEALERS**



"Easiest handling car I've ever driven. A wonder for economy . . . 19 miles per gallon in country driving. In my opinion the Chrysler Royal is the smartest looking car on the road."

**MRS. OZIE STEVENS**  
San Francisco, Calif.



"The Royal is my third Chrysler . . . and it's a wonder. It rides like a very big car but handles easier than any car I ever saw. Wonderful power and performance with real economy."

**WILLIAM E. MENDENHALL, M. D.**  
Indianapolis, Ind.



"I've picked Chrysler engineering three times, and the 1938 Chrysler Royal is the greatest of all. In mountain driving, I can pass anything on the road, yet I get around 18 miles to the gallon."

**MALCOLM P. FRERET**  
Birmingham, Ala.



"I drive hard and fast . . . and the Chrysler Royal takes anything in its stride. The Overdrive is a wonderful feature, and Chrysler's hydraulic brakes are without equal anywhere."

**MURRAY ERICK**  
Los Angeles, Calif.

## **CHRYSLER AND PLYMOUTH**

## Modern European Racing Engines

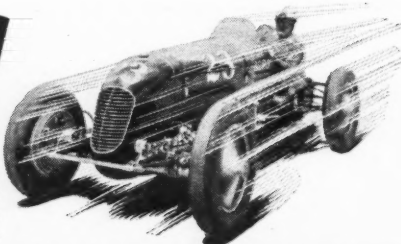
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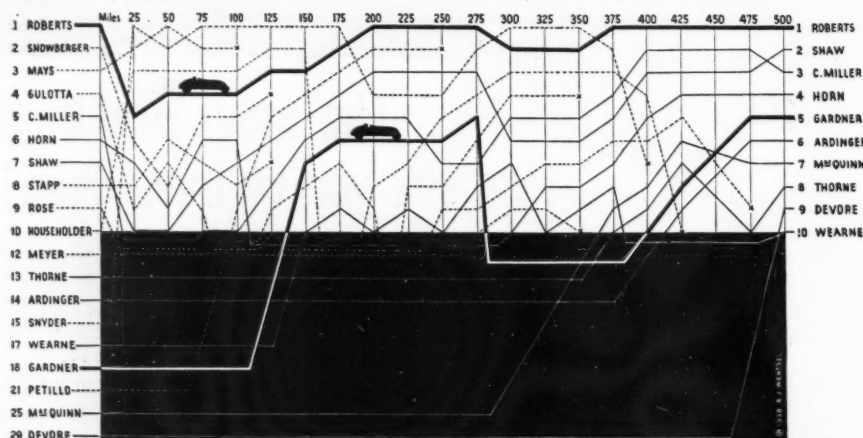
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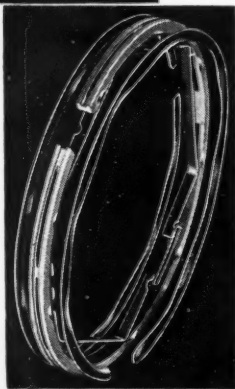
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**MURRAY ERICK**  
Los Angeles, Calif.

## **CHRYSLER AND PLYMOUTH**

## New Pumps

(Continued from page 26)

according to Sumner S. Howard, AC's director of service, enables the dealer to immediately exchange a pump instead of repairing it or sending it out for repair. The big advantage of this plan is twofold. The service is practically instantaneous. The owner is not deprived of the use of his car because he does not have to wait for pump repair work. And of greatest importance, he does not run the risk of improper fuel pump servicing.

In discussing the AC Fuel Pump Rebuilding System, Mr. Howard, who

played an important part in the establishment of the rebuilding plants and who directs their supervision, had this to say:

"Before establishment of the rebuilding plants, service on fuel pumps was haphazard and there was limited control on the quality of the work.

"There were numerous cases of over-pressure on faultily repaired fuel pumps, which caused gasoline wastage. On the other hand, some improperly repaired pumps resulted in lack of capacity, causing loss of power at high speed. Then there were failures of some poorly repaired pumps, causing complete stoppage of the engine.

"Dealers are very much pleased

with the plan. It means a guaranteed unit for their customers; a regular profit not only in goodwill but from a monetary standpoint, too. For the dealers, no labor is involved to any extent, and they have no stock of pump repair parts which are constantly obsoleted.

"Every pump received for re-building is first completely disassembled. All parts are cleaned in special, heated washing tanks. The castings are then inspected. All wearing parts, such as rockerarms, pull rods, valve seats and linkage are carefully gaged on special checking fixtures which definitely indicate whether one part can be used or should be scrapped.

"In the assembly operations, all diaphragms, valves, valve springs and gaskets are automatically replaced with new parts—other parts of the pump are replaced as inspection need shows.

"The pumps are assembled on a progressive assembly line, similar to the new pump production line at the factory, using the same type of fixtures for properly flexing the diaphragms and other precision operations as those used at the factory.

"Pumps are then tested, painted, wrapped and packed in sealed and labeled cartons—a guaranteed product for the service field.

"The re-building plan is a most practical and successful one. It may, in my opinion, mark a trend for other engine unit exchange plans, such as generators, carburetors, automatic chokes, starting motors and other precision units or assemblies."

The 21 AC fuel pump re-building plants are in the branches of United Motors Service located in Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Indianapolis, Kansas City, Los Angeles, Minneapolis, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, San Francisco, Seattle and St. Louis.



## I'll Make Your Place Headquarters For Headlight Reflector Jobs!

Sure-Plate re-silvering equipment will add a profitable department to your business with a minimum investment . . . for the cost of the complete equipment is so low that it will pay for itself on the first dozen jobs.

Motorists everywhere realize that a headlight is no better than its reflector and now is the time to cash in on the growing demand for greater driving safety.

The average cost of Sure-Plate is only 25c on jobs that normally sell for \$2.00 to \$3.00. Don't let profitable business like this get away from you. Order from your jobber today.

## SURE-PLATE

"B" Assortment  
\$12.50 Net to dealer.  
Slightly higher in  
Canada



## I'll Permanently Repair Those Cooling System Cracks In Thirty Minutes

Sure-Weld can't be beaten for speed or satisfaction. It permanently repairs cracks in valve ports, cast iron and aluminum cylinder heads, inside cracks and water jackets. And your customer can drive his car away within thirty minutes.

\$1.40 per pint net to dealer. Slightly higher in Canada.

Sure-Weld will not clog radiators and has a cleansing effect on the entire cooling system. It's tried and tested . . . and fully guaranteed. You'll make friends and lasting customers with Sure-Weld . . . and a generous profit every time you recommend it.

## SURE-WELD



## Don't Drain That Cooling System! I'll Remove All Rust and Rust-Proof All Metal Without Draining or Flushing!

Think of it! Without draining the cooling system, Kleerust goes to work while the car remains in normal operation. Within a month all rust will have been dissolved and all cooling system metal rust-proofed for a whole year. Even the original water will have returned to its crystal clearness.

Dealer's net price 60¢ per pint in doz. lots. Slightly higher in Canada.

Your customers will welcome Kleerust. Be sure you can supply them. Your jobber has Kleerust.

## KLEERUST

IN CANADA  
SURE-RITE PRODUCTS, Canada, Ltd.  
20 HAYTER STREET, TORONTO

EXPORT DEP'T.  
REX-HIDE EASTERN, INC.  
33 W. 60TH STREET, NEW YORK CITY

SURE-RITE PRODUCTS CORP., 6010 N. CAMAC ST., PHILA., PA.

## Addendum

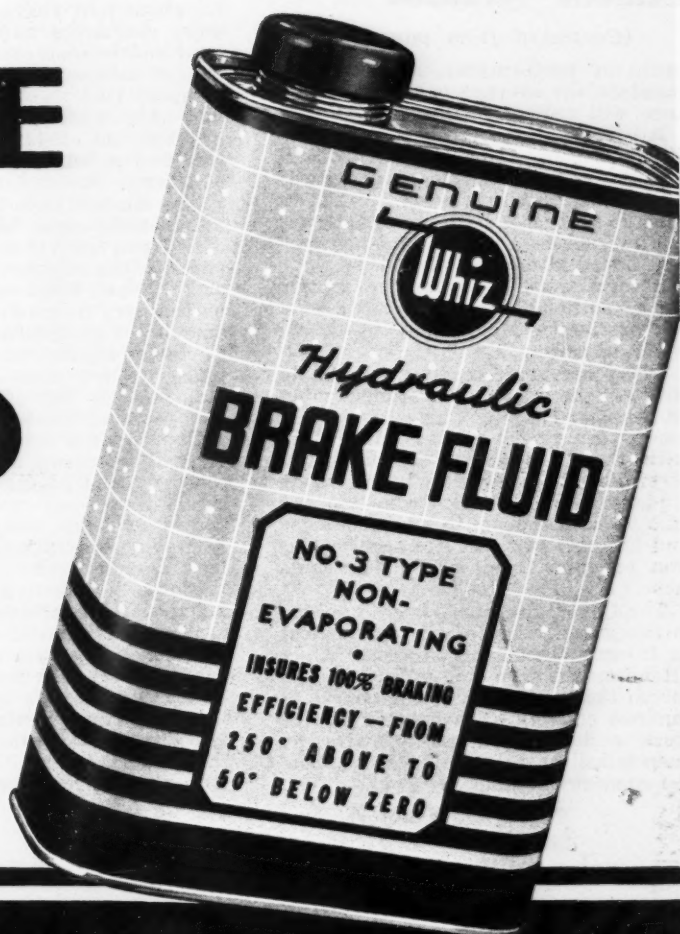
On page 42 of the August issue of MOTOR AGE we called your attention to a new marking pencil, introduced by the Lake Chemical Co., which is actually paint. We neglected to mention one of their outstanding features—the fact that they are composed of a washable paint, which makes them suitable for use in marking tires and windshields.

## McQuay-Norris Announces New Cylinder Gage

A new centromatic cylinder gage for measuring cylinder size, taper and out-of-round has recently been introduced by the McQuay-Norris Mfg. Co., Cooper and Southwest Avenue, St. Louis, Mo. An outstanding feature of the design of this instrument is its ability to function over the entire length and circumference of the cylinder. Consequently, the maximum wear usually just below the upper ring ledge can easily be determined and any pockets or distorted areas in the cylinder wall can be discovered. For complete information and prices, write the manufacturer.



*Now* **THE  
BEST  
IS PRICED  
WITH THE  
REST!**



**PATENTED ... APPROVED ... ACCEPTED**

**WHIZ No. 3 Now Sold in Volume in 139 Countries**

The most completely non-evaporating brake fluid on the market.

Responds uniformly to pedal pressure at temperatures ranging from 250° above to 50° below.

Inseparably mixes with every other approved fluid.

Patented formula guaranteed free from chemicals injurious to brake system.

Non-poisonous.

**ONE TYPE SERVICES ALL HYDRAULIC EQUIPMENT**

**R. M. HOLLINGSHEAD CORPORATION • Camden, N. J. • Toronto, Canada**

"B" Assortment  
\$12.50 Net to dealer.  
Slightly higher in  
Canada

## SURE-PLATE



\$1.40 per pint net to dealer. Slightly higher in Canada.

You'll make friends and lasting customers with Sure-Weld . . . and a generous profit every time you recommend it.

### SURE-WELD

IN CANADA  
SURE-RITE PRODUCTS, Canada, Ltd.  
20 HAYTER STREET, TORONTO

SURE-RITE PRODUCTS CORP., 6010 N. CAMAC ST., PHILA., PA.



Dealer's net price 60¢ per pint in doz. lots. Slightly higher in Canada.

Your customers will welcome Kleerust. Be sure you can supply them. Your jobber has Kleerust.

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60

When writing to advertisers please mention Motor Age

MOTOR AGE, September, 1938

## Carter School

(Continued from page 25)

peaks of performance, and if up to standard the average engine performance will take care of itself.

It is natural, therefore, that in planning the course, for the Carter Service School, a three-fold program was established with one week devoted to each of the three divisions as follows:

First week—Fundamentals of carburetion and engine operations.

Second week—Carburetor service work—actual bench work.

Third week—Motor tune-up—actual work on cars.

There are some requirements as to entering the school. The student must be employed by a Carter franchise account or a service station equipped with the Carter general cabinet of service parts. The school prefers as students the mechanics who actually will be called upon to do carburetor and kindred work in the service station or shop from which they have come.

The Carter Service School is unique in two ways. First of all, paradoxical as it may sound, the students while attending the school actually are paid for so doing. Secondly, the course is confined entirely to carburetor service work and engine tune-up, with no "pep-talks" or sales talks as regards the company.

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The student pays his own expenses, but in some cases his employer helps out. Upon arrival in St. Louis he reports to the registrar the same as he would in any other school. He is given preliminary instructions and a certain amount of equipment and tools. The Carter Company helps him to find a place to live near the factory and maintains a list of approved hotels and rooming houses.

The student while in the school, virtually becomes an employe of the company and his name is entered on the Carter pay roll. He receives wages at shop rates and obeys the rules and regulations even to punching the time clock.

Classes are limited to eight students and the three classes operate simultaneously each with its own instructor. Each instructor, therefore, has a new group each week.

The first week's instruction is devoted to fundamentals and students are given a thorough knowledge of the carburetor and its function. Each student is given a carburetor which

he keeps in front of him while the instructor carries on. Large charts and blackboard diagrams are generously used. The instructor keeps his talk practical and purposely refrains from theory. The students as a class, are not engineers but mechanics who for the most part work with their hands and are primarily interested in how to actually repair and adjust carburetors.

In the second week of instruction the students are given actual service assignments on carburetors. Each student has his bench and equipment with which to do the work. The carburetors are ones which actually need service work and such as will be encountered by the men when they return to the service stations from which they came. The men put into practice what they learned the previous week and get practically every type of repair job they are likely to encounter.

This class room is equipped with parts bins. The student draws the parts he needs for repairs just as he would in his own shop.

The third week is given over to engine tune-up. It is a bringing together of the things learned the previous two weeks supplemented by instructions in those important things bearing on general engine performance as ignition timing, breaker point setting, valve lash, etc.

One of the interesting facts brought

# A \$5000 ADVERTISEMENT



The most completely non-evaporating brake fluid on the market.

Responds uniformly to pedal pressure at temperatures ranging from 250° above to 50° below.

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Patented formula guaranteed free from chemicals injurious to brake system.

Non-poisonous.

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out by a visit to the Carter School is that there are enough units and parts to go around so that each student has one. For example, if the discussion is on ignition distributors each student has a distributor before him. There is not just one unit which has to be "passed around the class." Obviously, this saves time and affords more intimate contact with the unit in question.

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surely these things cannot slip by unnoticed by the students working in this modern air-conditioned plant. After three weeks at Carter the mechanics are convinced that the product and the company are right.

On the last day of the course, when the men are graduated, they are given a short talk. The purpose of the course is summed up and emphasis placed on the importance of service work. The talks are informal and friendly. The men know they have not been "slide-ruled" to death nor have they had to listen to high pressure sales talks.

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In talking with mechanics who have attended the Carter service school you learn that they have become better salesmen although they actually are given no sales training. Carter believes and the evidence substantiates this belief, that the best sort of selling the service station can do is to render good service.

## When They Score

(Continued from page 15)

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Fig. 4 shows a bearing that failed because of insufficient clearance between it and the shaft. The bearing metal has cracked and flaked out and the bearing is blackened by the excessive heat.

Another point that should be carefully watched when replacing precision type bearings in connecting rods is the diameter of the bearing bore in the rod. In some cases the connecting rod spreads at the junction of the rod and cap so that the new bearing does not have complete contact in the rod. This results in poor heat dissipation and bearing failure at or near the point of parting of the upper and lower halves of the bearing.

## Rice and Phelps Join Weaver Organization

The Weaver Manufacturing Co. announces that M. D. Rice and C. H. Phelps, both of whom are well known in the automotive industry, have recently joined Weaver and assumed duties in the sales promotion and engineering departments respectively.

WRITTEN—NOT BY US—BUT BY  
THOUSANDS OF BRAKE MEN

## Carter School

(Continued from page 25)

peaks of performance, and if up to standard the average engine performance will take care of itself.

It is natural, therefore, that in planning the course, for the Carter Service School, a three-fold program was established with one week devoted to each of the three divisions as follows:

First week—Fundamentals of carburetion and engine operations.

Second week—Carburetor service work—actual bench work.

Third week—Motor tune-up—actual work on cars.

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One of the interesting facts brought

# A \$5000 ADVERTISEMENT

Excerpts from thousands of entry blanks which came to us from 1 out of 5 service shops in America in Grey-Rock's recent contest...asking experience reasons...

**"WHY  
GREY-ROCK  
IS THE  
FASTEST-  
GROWING  
LINE?"**



**BECAUSE THE PUBLIC ENJOYS "Boxed, branded, and nationally known merchandise certified to give 1938 performance on any year's car" \* \* \***  
**"Quick, quiet, smooth stops with long wear" \* \* \***  
**"All-weather dependability at a fair price" \* \* \***  
**"Readily available service from high-calibre shops" \* \* \***  
**"Lower costs per mile from a manufacturer whose new-car and replacement supremacy assures utter reliability" \* \* \***

**BECAUSE THE SHOP OWNER GETS "Brake balancing systems for both passenger cars**

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# Grey-Rock



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(Continued from page 15)

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# WRITTEN—NOT BY US—BUT BY THOUSANDS OF BRAKE MEN

and fleets" \* \* \* "Satisfied repeat customers" \* \* \* "Steadily increasing profits and effective advertising helps" \* \* \* "Correct linings for all cars from a minimum of stock" \* \* \* "Materials which guarantee the right brake action on new or old cars" \* \* \* "A plan which overwhelms gyp competition and eliminates waste" \* \* \* "Enthusiasm from mechanics" \* \* \* "A resultful merchandising plan" \* \* \* "The famous Guide which solves all fleet brake problems."

BECAUSE THE MECHANIC REJOICES IN "Pre-selected materials which prevent mistakes and can be installed with absolute confidence" \* \* \* "Simple accurate relining instructions and really effective trouble-shooting helps which improve workmanship and cut labor-time" \* \* \* "Unprecedented accuracy" \* \* \* "Protection of wages and profits by virtually ending comebacks" \* \* \* "A name which signifies a whole modern system of Balancing Brakes" \* \* \*

# BALANCED BRAKES

## Valve Facts

(Continued from page 21)

definitely better than they ever have been, but hardened seats introduced some problems which make it desirable to do a valve job around 5,000 miles, after which the owner is pretty safe in getting over 40,000 miles or more of operation before the valves have to be tackled again.

Along about 1933 when there was considerable discussion about hardened inserted exhaust valve seats there came the question of whether the seat was to be considered as permanent or replacement in the field. The current practice at that time was

to make the seats replaceable. Many service men, however, found this to be a difficult job. There even was a question whether the replacement feature was essential. *Automotive Industries* in those days said "it is quite likely service experience will demonstrate that a well designed seat of proper material will last as long as the block, and require no other attention than that of truing up after a long period of service."

And that is just about what happened and happens today. Several years before 1932 Albertson was making valve seat rings of cast alloy materials which proved quite successful. Some changes and research tests proved that a seat insert made from

a material which would stand up under continual pounding of the valve under heat and gas fumes was far superior to the original seat cut directly in the block.

A hardened seat has a tendency to expand and contract considerably and when it does this it pushes out the side walls of the recess. Thus, sooner or later the seat becomes loose. Some 6 or 7 years ago Albertson developed a seat insert which had the characteristics of a valve seat that approached very closely ideal conditions. Today, these Sioux hardened valve seat rings are made of Molybdenum Chromium material, a hot rolled compact bar material which maintains its hardness at red heat, with resistance to acid fumes, heat and wear, at the same time retaining its original hardness. They come with the seat already ground but the seat must be trued up concentric with the valve guide after installation. These rings are held in the recess by rolling the block metal in around the ring over the chamfered or beveled edge with a special rolling tool.

Getting back to valve work on comparatively new models let's, first of all, take a look at illustration Fig. 1. This shows in exaggerated form what can and frequently does happen with valves of an engine in a car with less than 5000 miles on it.

Distortion which causes one or more valves to be held open can be caused by warpage or from improper tension of the cylinder head stud nuts. Notice in Figure 1, for example, that both the intake and exhaust valves do not close because of distortion.

As a matter of fact, tests have shown that there can be a variance of as much as 100 lb. in between the studs. This is so because very often the mechanic finds some nuts much easier to get at than others. Thus, the easy ones are tightened more and that's where the trouble starts. That is precisely why no cylinder head nuts or crankshaft main bearing cap nuts should be tightened without a torque-indicating or tension wrench.

But distortion or warpage also can occur from other things. Cast iron is still cast iron and while much progress has been made in lengthening the periods between valve grinding jobs due to better materials in valves, hardened seats for exhaust valves and so on, there still remains to some extent the uncertainty of cast iron.

When cast iron cools from its molten stage, certain strains are set up in some sections of a cylinder block. In the old days they used to dump the blocks out-of-doors and let them "season" for weeks at a time. This took out most of the strains and stresses and then when the blocks were machined there was less danger of warpage when the engine was placed in service.

Today blocks are annealed in furnaces to remove the stresses and strains. That is, the seasoning process is speeded up to meet production schedules. Very good success is attained by annealing but the nature of the beast is still in cast iron and even in engines that have seen only a small amount of service there may be every good reason for the service man to check up the valves for proper seating.

A valve that seats every time it



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### WILL MAKE

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# New Portable

## NIEHOFF

### "GENEROMETER"

### MAKES EVERY VOLTAGE

### REGULATOR • RELAY AND

### GENERATOR TEST

### ✓ ✓ ✓ CHECK THESE PERFORMANCE FEATURES

★ Greatly simplifies all generator, regulator, and relay adjustments.

★ Accurately checks generator charging rates, field currents, regulators, and relays. Detects high resistance connections.

★ Indicates lamp, radio, and other accessory load readings.

★ Operates from car equipment without use of outside current.

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BRANCH: 1342 S. Flower, Los Angeles, Cal.



**C. E. NIEHOFF & CO.**

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★ **ENGINEERED FOR ACCURATE PERFORMANCE AND DEPENDABILITY** ★

**NO** repair shop should be without this **MASTER Electrical Testing Equipment** that saves mechanics time—creates customer confidence and increases parts and labor sales.

This new, **NIEHOFF CERTIFIED GENEROMETER**—with attractive two-tone anodized aluminum panel—is brimful of eye appeal. It is simple to operate—easy portable. An amazing and successful merchandiser of replacement parts that will build extra profits into your business.

Arrange **TODAY** to be first in your territory with this sensational, new Testing Equipment that is the last word in accuracy and performance and "cash-in" on the added sales volume it is bound to create.



closes becomes tighter, acting like a wedge. But when the valve is held open, due to a condition as in Fig. 1, for example, the valve face and seat are exposed to the ravages of the combustion flame and the searing never gets better, but does get worse.

It is not out of line to suggest a valve inspection job to the owner of a car with some 5000 miles on it. If the inspection indicates that a valve job should be done the owner can be assured of a long period of operation before similar work is necessary—probably 30,000 or 40,000 miles. Cars have gone longer than these figures after an initial valve job which compensated for warpage and distortion of the new block and allowed the valves to function correctly.

And the valve job itself? Well, when you are "all ears" at the Albertson plant you learn that valve jobs start with a straight line. This straight line runs through the center of the valve guide, Fig. 2. And, since engine valves are made with the head concentric with the stem, it naturally follows that this straight line must also pass directly through the center of the valve seat.

Since the valve stem guide positions the valve it becomes obvious that whatever work is done on the valve seat must proceed from the center line or axis of the valve stem guide.

And that's why Albertson introduced a long time ago the Sioux tapered pilots which are turned with a slight pressure into the guide and anchored rigidly in the least worn part and furnish a fixed point from which all subsequent operations on the valve seat are performed.

These pilots are furnished in many sizes to take care of any degree of wear in the valve guides. The pilots serve as a plug gage for checking wear in the guides.

To get a better idea of the multitude of pilot sizes available take the case of a  $\frac{1}{8}$  in. pilot. There are nine sizes, ranging as follows:

$\frac{1}{8}$  less .007;  $\frac{1}{8}$  less .003;  $\frac{1}{8}$  less .002;  $\frac{1}{8}$  less .001;  $\frac{1}{8}$  plus .001;  $\frac{1}{8}$  plus .002;  $\frac{1}{8}$  plus .003;  $\frac{1}{8}$  plus .004.

After the one correct size is turned into place (the guide having previously been thoroughly cleaned out with a valve stem guide cleaner) the valve seat is wiped clean and its condition determined with a dial indicator. This indicator slips over the upper end of the tapered pilot, is set to zero reading and then slowly revolved around the entire valve seat. This shows the amount of error or out-of-roundness of the seat in thousandths of an inch.

Ascertaining the condition of the valve seat by this indicator is not only of benefit to the mechanic but also affords an opportunity to show the customer the condition of the valves. Especially is this true when there has been some reluctance on the part of the customer to have the indicator to guide the mechanic in doing a precision job. It is quite impossible by merely looking at a hardened valve seat to determine its condition, especially the concentricity with the valve stem guide. And it's just as difficult after grinding the seat to know if the job has been correctly done without measurement.

The actual work of grinding a hardened seat is quickly done. But it

requires the right kind of equipment and a little care on the part of the operator. In the case of the Albertson Sioux Dual Action valve seat grinder the speed of the tool is almost beyond belief—13,000 r.p.m. This speed is transmitted directly to the grinding wheel holder.

You learn at the Albertson plant that this speed is absolutely necessary to cut the hardened seats used in engines of today. This speed and the dual-action of the grinder (the driver is slightly oscillated from side to side) produces fast cutting, accuracy and a mirror finish.

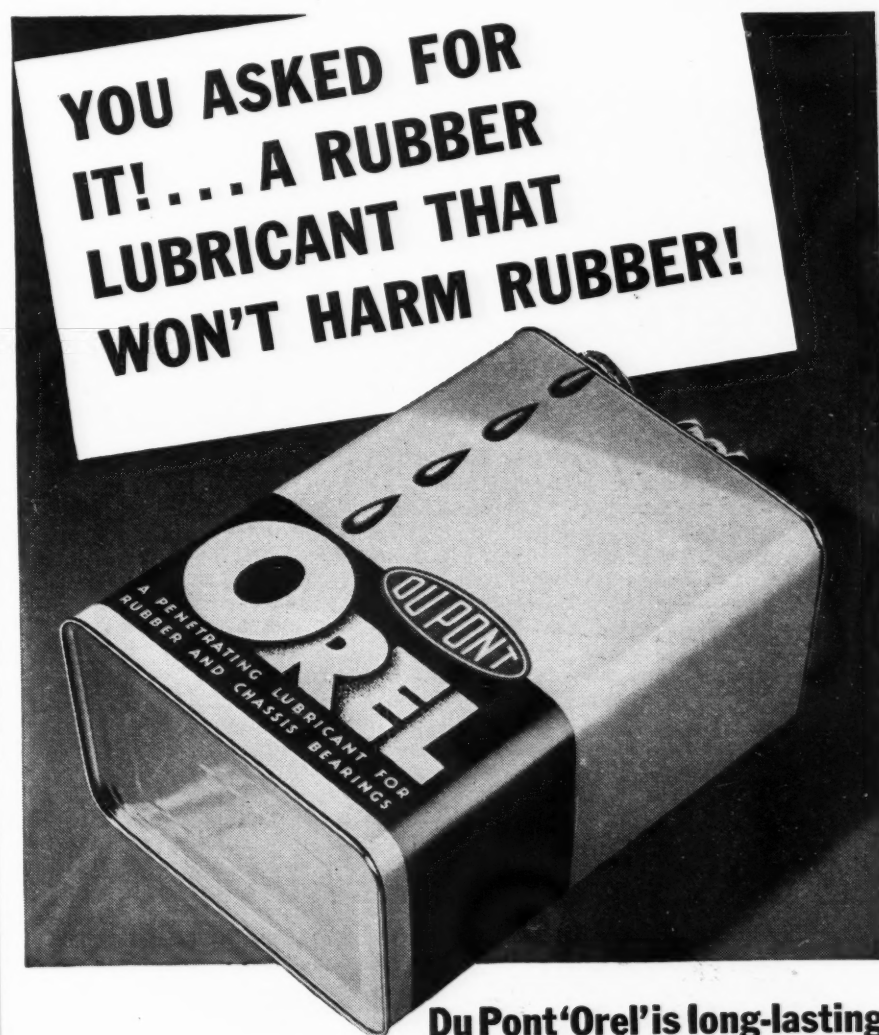
And now something about Sioux valve seat grinding wheels. Double service can be exacted from these.

Wheels are reversible on the holder.

The regular 45 deg. wheels can be turned over and dressed to 30 or 60 degrees on the dressing tool. The 30 degree can be used for top cut narrowing or for 30 degree seats, and the 60 degree for inside narrowing.

A practical and economical method, as some cars have 30 degree intake valves and 45 degree exhaust valves.

Sioux Valve Seat Grinding Wheels come either 45 degree or 30 degree. If one side becomes worn, the wheel can be turned over and dressed down to the required angle on the other side. Roughing wheel should be used for fast cutting, particularly on hard seats. Finishing wheel should be used to give the seat a high polish.



## Du Pont 'Orel' is long-lasting rubber and metal lubricant based on new principle

**Y**OU'VE always wanted a rubber lubricant that won't harm rubber. Here it is! Developed by Du Pont chemists, "Orel" says, "Quiet, please, and stay quiet" to all rubber parts and metal-to-metal chassis contacts. And it does this job with no harmful effect on rubber parts!

"Orel" is different from any of the "penetrating oils" you've been using. It penetrates far deeper . . . reaches the "canaries" you can't get at any other way.

Use "Orel" on bushings in shock ab-

sorber arms, spring shackles, sway eliminator bars, motor and body mountings, rubbers between spring leaves, fan belts. It's easy to apply with a brush or with an oil can that squirts a thin stream.

"Orel" is made by Du Pont, makers of "Zerone" Anti-Rust Anti-Freeze.

Order your supply of "Orel" from your "Zerone" jobber today. Cases of three gallons, \$1.85 per gallon. Five-gallon containers, \$1.75 per gallon. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

## Jenkins' Speed Bid

(Continued from page 16)

Leaving John Cobb alone to the pioneer idea of sitting in the nose of the "Railton," Jenkins will drive from the center of his mount. One motor has been placed in the front of the "Meteor" and the other has been bolted at the rear, similar to the Eyston blue-print.

Jenkins will depend on the conventional four wheels for traction, thus falling in line with Cobb's design. Eyston's "Thunderbolt" has eight wheels, two pairs in front and dual wheels on the rear. Sir Malcolm Campbell's 1935 "Bluebird" ran on six

wheels, one pair in front and duals on the rear.

What his attempt at super-speed is going to cost, Jenkins frankly admits will remain pretty much of an uncertainty until the auditors tally his books at some later date.

"The cost," Jenkins has so far determined, "will be certainly not less than \$75,000, without the motors." And if you'll add the present market value of a pair of Curtiss flying engines, you'll have a fair idea of the extent to which Jenkins has dipped into the bank account.

The late Bill Sturm, manager for Sir Malcolm Campbell during the now retired speed king's American activities, once reported that the "Bluebird"

had cost "at least \$100,000" and that was before its final run at Bonneville at the 301.1292 miles per hour gait in 1935.

In Jenkins' announced bid for the most coveted of automobile speed records, there is a note of patriotism.

Not since Ray Keech, the Philadelphian, crashed to his death at a thundering pace on the board Altoona Speedway in 1929 has there been a serious American contender for the mile record. Several have announced plans for such an assault, among them Barney Oldfield, Harlan Fengler, Lou Moore and a long list of less serious contenders which reaches away out to here.

Of the American drivers capable of ending the long unchallenged reign of the British speed kings, made more difficult this year with the addition of John Cobb to the aspirants, Ab Jenkins has the nod.

He was setting distance records back in 1926 when the late J. G. Parry-Thomas sat on the speed throne because of his 170.624 miles per hour established on Pendine sands, in Wales. In that year, Jenkins turned in a transcontinental record when he rushed from New York city to San Francisco in eighty-six hours and twenty minutes.

In 1927 he bettered that record with seventy-seven hours and forty minutes and then went to the board Atlantic City Speedway and averaged 79.6 miles per hour in a stock car to set a 500-mile record.

In 1928 Jenkins established a one-man, one-day driving record of 84.15 miles per hour for twenty-four hours; followed it up with a dusk-to-dusk record of 85.2 miles per hour, and squeezed in a speed of 60 miles per hour up the hill at Uniontown, Pa., then the goal of record drivers.

Other hill climbs were added in 1930 and in 1931 Jenkins set thirty-nine AAA stock car records when he drove into San Francisco 54.1 hours after leaving New York. The AAA no longer allows records on the highway.

Jenkins' annual visits to Bonneville Saltbed began in 1932 when he drove 2,710 miles in twenty-four hours for a record average of 112.91 miles per hour. In 1933 he drove 3,000 miles in 25.5 hours at an average of 117.98 miles per hour to add fourteen world and fourteen international class records and a long list of American marks. Again in 1934, 1935, 1936 and last year he swelled his crowded list of achievements—many of which are on the international records books of the world-wide governing organization at Paris, France, the International Association of Recognized Automobile Clubs.

With each succeeding record, Jenkins, a native of Salt Lake City, Utah, eyed the straightaway mark with envy, promising himself that he would rule that class. But not until a year ago did he make any definite announcement that he would attempt the flash run.

In true Jenkins thoroughness, he waited until he had his straightaway car three-fourths completed before he verified even to his friends that he would definitely challenge Captain George Eyston and John Cobb this November.

Find the **RIGHT** size  
...at the **RIGHT** time  
...with the **LAMSON**  
"25" Line Treasure Chest

You don't need to sweat and swear and hunt for the right size bolt, nut, cotter or cap screw today! There are 118 different sizes and kinds of fastenings in the LAMSON Treasure Chest—all neatly packed in the 15 plainly labeled drawers of a steel cabinet that fits the end of your stock shelf or counter. Just decide what you want—and reach for it—and there it is! No wondering about quality—LAMSON products supplied the trade are the same as those furnished the original manufacturer.



The  
**LAMSON**  
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You make a profit every time you sell LAMSON products for repairs because you know how to sell them—each drawer front label shows the size and the price of each product. No danger of underpricing or "giving away" your profits. Complete stock priced from \$9.95 to \$29.50—steel cabinet included. Ask for further details, from your Jobber's salesman or the factory.

**THE LAMSON & SESSIONS CO.**

GENERAL OFFICES, CLEVELAND, OHIO

Manufacturers of the **LAMSON "25" LINE**





# 50,000 GOOD MECHANICS CAN'T BE WRONG

## PROFIT!

Blue Crown Spark Plugs not only give complete consumer satisfaction but the price schedule provides much more profit for you. Ask your jobber.

**BLUE CROWN SPARK PLUGS  
ARE SOLD EXCLUSIVELY  
THROUGH JOBBERS**

To plug your sales of BLUE CROWN plugs the Motor Master Products Corporation makes available an attractive display cabinet.



50,000 good mechanics, whose customers rely on their judgment and ability to "shoot" trouble, have risen above ordinary mechanics. Not content with making spark plug replacements with new car spark plugs, they looked for and found Blue Crown "Air-Cooled" Spark Plugs—plugs better suited to engines which have run 10,000 or more miles.

Blue Crown "Air-Cooled" Spark Plugs are not built as factory equipment—they are for replacement purposes. Blue Crown "Air-Cooled" Spark Plugs are made to compensate for the wear and tear in miles of hard usage, encrusted water jackets, "wet" motor conditions, and terrific heat under high compression.

These 50,000 good mechanics realize worn motors function better on spark plugs designed especially for motors in use. Their customers backed them up—they used Blue Crown "Air-Cooled" Spark Plugs and learned they give better performance under severe service conditions.

50,000 good mechanics can't be wrong. They put Blue Crown "Air-Cooled" Spark Plugs to the test and they are happy in their choice. You, too, can realize the larger profit to be taken in greater customer satisfaction by making Blue Crown "Air-Cooled" Spark Plugs your happy choice. See your jobber or write for further details.

## WHY AIR COOLED?

Above certain temperatures a spark plug loses efficiency as the heat increases. The steel shell expands faster than the porcelain causing a separation and an attendant leak. All this weakens the plug under severe strain and shortens its life. Through special construction embodying knurled fins, Blue Crown "Air-Cooled" Spark Plugs dispel heat 17% faster. Not only do they give better service, they last longer.

**BLUE CROWN "Air Cooled" SPARK PLUGS  
Are Designed for Every Type of Motor Service**

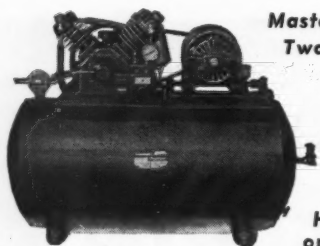
**MOTOR MASTER PRODUCTS CORPORATION**  
4757 Ravenswood Avenue Chicago, Illinois

**EXPORT DISTRIBUTION**  
**BORG WARNER INTERNATIONAL CORP., CHICAGO, U. S. A.**

# BLUE CROWN

**THE SPARK PLUG THAT'S 17% COOLER**

## INVESTIGATE



Master Series  
Two Stage

Horizontal  
or Vertical

## WILMINGTON COMPRESSORS

• Before you invest, investigate the new Master and Standard Series. Designed and built by air compressor specialists. A dozen new features and refinements, but the same careful craftsmanship.

• Get our 1938 Catalog. See for yourself the powerful, compact, space-saving models; new valves; new cooling features; ingenious ideas for quiet, efficient operation. Then you will understand why Wilmington Compressors are breaking all previous sales records.

**THE AUTO COMPRESSOR CO.**  
S. Mulberry St. Wilmington, Ohio

## Staneck Leads Midgeteers

With recent crashes keeping Paul Russo out of a number of races, Ed Staneck has climbed to the top of the heap in the battle for the midget championship.

Staneck was riding some 200 points above Russo as MOTOR AGE went to press. In third place was Ernie Gessell, fourth, "Red" Redmond; fifth, Bill Morrissey; sixth, Tommy Hinner-shitz; seventh, Frank Bailey; eighth, Bill Holmes; ninth, Mike Bower; tenth, Henry Banks. All formerly confined their activities to big car racing.

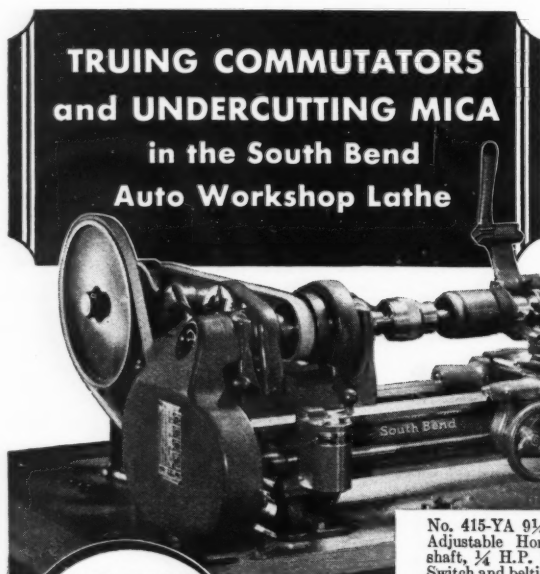
## Gas Pump Hose Of Synthetic Rubber

The DeVilbiss Co., 300 Phillips Avenue, Toledo, Ohio, has developed a gasoline pump hose of synthetic rubber which is said to have a high resistance to gasoline and oil, positive seepage protection, controlled hose expansion and minimum flow resistance. Full protection against fire hazards without loss of flexibility is provided by an improved design of woven wire static eliminator.

## YOU NEED THIS LINE LINKERT PERFECT ENGINEERED PARTS FOR CARBURETOR REPLACEMENTS



**CORRECT ASSORTMENTS  
FOR  
CHEVROLET  
AND  
PLYMOUTH**  
**LANGSENKAMP-LINKERT CARBURETOR CO.**  
INDIANAPOLIS - INDIANA



**TRUING COMMUTATORS  
and UNDERCUTTING MICA  
in the South Bend  
Auto Workshop Lathe**

**\$85.00**

Less Motor Drive

Terms as Low as

**\$6.00**

a Month



**South Bend  
Lathe Works**

240 East Madison St.,  
South Bend, Indiana, U.S.A.

Send the following booklets Free, postpaid

- ☐ How to True Commutators
- ☐ 9" Auto Workshop Lathe Bulletin
- ☐ Easy Payment Plan

Size of lathe interested in.....

Name .....

Address .....

City..... State.....

**SOUTH BEND Precision LATHES**

No. 415-YA 9 1/4" x 3' Workshop Lathe with Adjustable Horizontal Counter-shaft, 1/4 H.P. Reversing Motor, Switch and belting..... **\$117.00**

You can true commutators and undercut mica quickly and accurately on the South Bend 9-inch Auto Workshop, back-geared, screw cutting lathe, and also get the extra profits from doing the other six important jobs which this lathe handles. With attachments the auto workshop lathe refaces valves—finishes pistons—bores reabbitted connecting rods—makes bushings—cuts screw threads—trues armatures—and does hundreds of similar automotive and general machine operations covering 95% of the work coming into the modern auto service shop.

Use the coupon—Get the new auto service bulletin No. 33-G with full-page illustrations showing these jobs. Write for details on our liberal easy payment plan.

**68 Sizes and Types of Lathes  
for every purpose**

- 9" lathe prices start at \$ 85
- 11" lathe prices start at \$371
- 13" lathe prices start at \$448
- 15" lathe prices start at \$544
- 16" lathe prices start at \$642

## Bonneville

(Continued from page 32)

coming new king of the speed realm. On August 19, in an unofficial run over a portion of the saltbed course, Cobb showed "at least" 300 m.p.h. with his turtle-shaped "Railton." Repairs were necessary to the car after that run, for the shell-body was dented by the terrific air pressure and the glass was almost pulled away from the cockpit hood in which the driver is enclosed. In his first unofficial test on August 9, Cobb was stop-watched at 250 miles per hour. The quick pickup of his power plant was advanced in the fact that he gained the speed in two and one-half miles. In that run, Cobb stamped his nose-seat position a success. "It feels grand sitting out there in front," he said, "and I noticed no awkwardness in the way the car handled."

## Brake-Floater for Ford Cars

The Super Brake-Floater Corp., 4616 West Twentieth Street, Chicago, Ill., has placed on the market a device known as the Super Brake-Floater, which is said to eliminate chatter, groan and fade from the brakes of Ford cars from 1928 to 1938 models. The device is said to give full-circle contact of both brake shoes, giving complete self-energizing results and braking action comparable to hydraulic brakes. Two models are supplied, one for models 1928 to 1934, and the other from 1935 to 1938 models. Write the manufacturer for complete information and bulletin.





## For All Your Brake Service Needs



"Our Special"  
Complete Combination  
**RIVETER-DE-RIVETER  
DRILLS  
COUNTERSINKER  
BRAKE LINING DRESSER**  
Fast — Efficient — Profitable  
Standard Tools Furnished

**\$39.50**

F.O.B. Kokomo, Ind.  
Standard Motor  
Specifications  
1/4 H.P. 110-volts  
50/60 Cycle A.C.

NEW  
"MODEL A-3"  
FOOT POWER  
**RIVETER-DE-RIVETER**  
Brake Lining Machine

**\$16.50**

F.O.B. Kokomo, Ind.

Furnished with quickly detachable tools that cannot twist in spindle socket.

Write today for further information.

**THE RIESS MANUFACTURING CO.**  
Kokomo Indiana

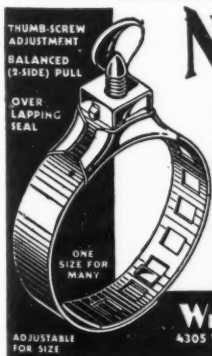
## DEVILBISS

Spray-Painting Equipment—Spray Booths—Canopy Exhaust Systems—Exhaust Fans—Air Compressors—Hose and Hose Connections—Oil Guns.

Write for catalog

**THE DEVILBISS COMPANY  
TOLEDO, OHIO**

Distributors or direct sales and service representatives available everywhere.



TRADE MARK  
**NOC-OUT  
HOSE CLAMPS**

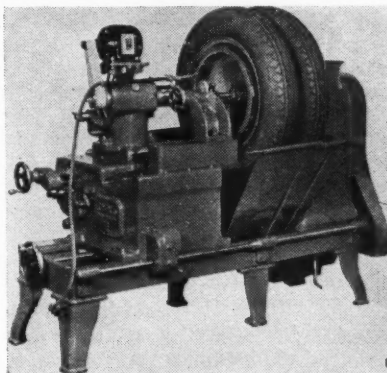
THE HOSE CLAMP WITH THE THUMB SCREW

Standard equipment of the automotive industry. Adjustable—one size equals many. Quick tightening, perfect seal. Makes radiators and heaters "Anti-Freeze" tight. Stock up now and be ready for the first cold snap. AT ALL JOBBERS.

**WITTEK MFG. CO.**  
4305 W. 24th Pl., Chicago, U.S.A.

## New Lempco Machine

Lempco Products, Inc., Bedford, Ohio, manufacturers of automotive service parts and precision machine tool equipment for the automotive service industry, announce the development of a new grinding and turning machine designed for internal and external grinding and turning. It is particularly adaptable for brake drum truing, flywheel refacing and turning,



clutch pressure plate re-grinding and other operations of a similar nature.

The new machine will be sold under the name of the Du-All Grinding and Turning Machine, and complete descriptive literature will be ready for distribution within the next few days.

The company has recently issued a new catalog on their Model C brake truing machine, explaining the importance of this work. Copies will be sent upon request.

## For Spring Cover Service

Designed especially for those who buy spring lubricant in containers of 25, 35 or 50 lb., a new cabinet type spring packer for use with their No. 821 Lubroclump in packing metal covered chassis springs has just been announced by the Aro Equipment Corp., Bryan, Ohio.



The pumping unit provides large volume delivery through the swivel mounted hose equipped with bayonet connector which also swivels, and the follower plate is available for use with lubricants which will not seek their own level in container. The Aro line also includes cabinet type and drum cover type spring packers for use with original 100-lb. drums.



## Handier...

Here's a metal finishing cloth that comes in handy economy rolls 1", 1½", 2" wide. Hang it above your bench. Tear off only what you need in the width you require.



## Quicker...

Electrocoated Aloxite Brand Aluminum Oxide Cloth cuts faster and leaves a clean, uniform surface because of the open spacing of the grain. Use this cloth for finishing metal and metal parts.



## Cheaper to use

The Economy Roll lives up to its name. You'll save money by using Electrocoated Aloxite Brand Aluminum Oxide Metal Finishing Cloth in The Economy Roll because you use only what you need.

**THE CARBORUNDUM COMPANY**

REG. U. S. PAT. OFF.

Niagara Falls, N. Y.

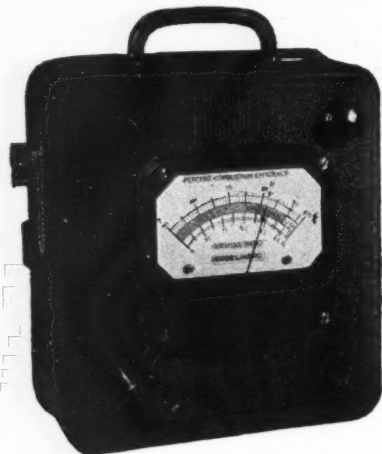
Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

[Carborundum and Aloxite are registered trade-marks of The Carborundum Company]

**CARBORUNDUM**  
REG. U. S. PAT. OFF.  
ABRASIVE PRODUCTS



## Tune up Your Sales with **THE ENGELHARD** Exhaustalyser



Your cash register will ring up the dollars more often when motor "tune-up" is done the Engelhard way. Exhaust gas analysis is the answer to your spring "tune-up" campaign. It makes it easy for you and your customer.

Write for Bulletin 601

**CHARLES ENGELHARD, Inc.**  
90 Chestnut St., Newark, N. J.

Manufacturers of Pyrometers, Resistance Thermometers, Combustion Indicators, Exhaust Gas Analysers, Flue Gas Analysers, Thermocouples.

### SIMMONS REPLACEMENT PARTS AND EQUIPMENT

*Sold  
thru leading  
Jobbers*

WRITE FOR  
CATALOGS

Automotive products  
of guaranteed qual-  
ity, including:

Parts for Ford,  
Chevrolet, Plymouth

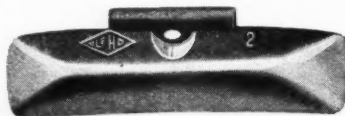
Mufflers Tailpipes  
Carburetors Exhaust Pipes  
Silver King Hydraulic Jacks

The Simmons Mfg. Co. • Ashland, Ohio

### New Wheel

#### Balance Weights

The Harley C. Loney Co., 16883 Wyoming Avenue, Detroit, Mich., has announced a new line of wheel balance weights. They are wider, longer, more



streamlined and heavier, and are designed to fit perfectly between the chrome ring and the edge of the rim for outside balancing. They are available in 1/2, 1, 1 1/2, 2, 2 1/2 and 3 oz.

### Oil Filter

#### Replacement Cartridge

The Fleming Mfg. Co., East Providence, R. I., maker of the Fram oil and motor cleaners, has announced a P-1/2 Fram replacement cartridge which can be used by owners of cars equipped with filters of other makes. The new Fram replacement cartridge employs the same chemically-treated,



waste pack method of filtering motor oil, and is reported to sell at a price no higher than conventional filters.

In introducing these cartridges, dealers will have the assistance of some attractive sales promotional material, including a three-color metal display stand.

## CLEAR PROFIT!

**HANDY** Battery Chargers operate at a lower cost, pay for themselves quickly, and then it's all Clear Profit. 2-yr. guarantee.

WRITE FOR BULLETIN **\$29.50**  
**BALDOR ELECTRIC CO.**  
4375 Duncan Ave., St. Louis



*Handy*

BATTERY  
CHARGERS



### WANTED!

One garageman in each town where we do not have a jobber, who has brains enough to buy his rings at jobber prices, by being our local jobber. 60% discount on orders of 2 sets or more in open territory on

### HALING Steel Vented Rings,

segment rings, or plain rings. Also piston expanders. Get our circular and details of our dealer-jobber plan.

"Shop tested" for 5 years, our rings are sold throughout the world, and work where others fail. More profit—less grief—proven.

Distributors wanted also, anywhere.  
**THE HALING COMPANY**  
Rochester, Minnesota



### POWERFUL—DEEP-TONED FAR REACHING

A Horn so Good it makes a Salesman out of every customer.

Prices as low as \$7.50 for Horn Only. Literature available on New Motor Controlled Fog or Driving Light.

**BUELL MANUFACTURING COMPANY**  
2983 Cottage Grove Ave., Chicago, Ill.

### Pin Hole Honing is Cheaper and Better than Reaming

● Never a dull tool or blade-marked hole; small investment; nothing to sharpen; no guess-work or inaccurate fits. Low cost replacement Abrasives; Micrometer Adjustment. Makes ANY mechanic an expert pin filter. Ask your Jobber today for Standard or Heavy Duty Pin Hone Set you need.

3-TOOL  
SET  
\$26

**HALL**  
PISTON PIN HOLE HONE

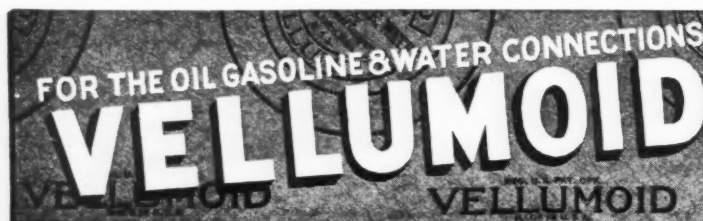
## CLASSIFIED ADVERTISING

INVENTORS . . . Protect your rights before disclosing your invention to anyone. Form "Evidence of Conception"; "Schedule of Government and Attorneys' fees" and instructions sent free.

Lancaster, Allwine & Rommel  
415 Bowen Building Washington, D. C.

Motor Temperature Gauges Repaired—All Makes Automobile—Bus—Tractor—\$1.50—Marine \$2.75. Lines shortened or lengthened. All Work Guaranteed.

United Speedometer Repair Company, Inc.  
436 West 57th Street New York City



Never a patched or broken gasket—you can absolutely rely on VELLUMOID. Be sure you get genuine VELLUMOID.

THE VELLUMOID CO., WORCESTER, MASS.



# Gardiner

30/70 BODY SOLDER

## NOW AVAILABLE IN 1/2 POUND BARS

Now the superior alloy that has made Gardiner meter bar, regular bar and 1/4-inch round body solders outstanding favorites with leading car makers, body builders and discriminating shops is available in 1/2-Pound Bars. Due to modern production methods they are priced lower than even ordinary solder. Your jobber can supply the new 1/2-Pound Bars of Gardiner 30/70 promptly... also wire and flux-filled Solders and Babbitts.



4839 South Campbell Ave., Chicago, Ill.

### NEW Sinko



#### DeLuxe EMBLEMIZED

Bronze Spin-Ur-Wheel & Gear Shift Ball

New "Rim-Mounting" DeLuxe Spin-Ur-Wheel with medallion inserts of the Shrine, Knights of Columbus, Masons and St. Christopher in bronze are now ready for your customers. New large "Acorn" Gear Shift Ball completes matched sets. Fits all modern steering wheels—no band to de-face outer rim. Fine choice of colors—red, onyx, green, yellow, grey, beige and brown.

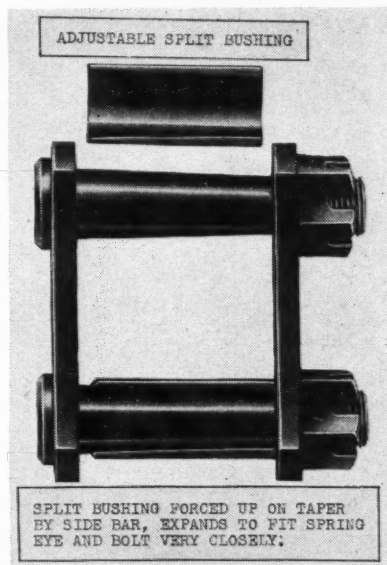
**SINKO TOOL & MFG. COMPANY**  
351 N. Crawford Ave. CHICAGO, ILL.



**SIMPLEX PRODUCTS CORP.**  
3820 Kelley Ave. . . . Cleveland, Ohio

## Permite Adjustable Spring Shackle

Aluminum Industries, Inc., Cincinnati, Ohio, makers of Permite products, has introduced a new spring shackle. The tapered shape of the shackle pin bolts, in conjunction with the tapered shackle bolt pin bushings, permits such complete adjustment in application that the manufacturer claims it will fit worn spring eyes as well as new ones. No special tools are required other than those normally used for installing shackles. The adjustable feature allows take-up for



wear and provides a continuous close fit, thus eliminating rattles, vibration and chassis sway, the transmission of shackle noises to the car body, and shackle or spring eye failure. Complete lubrication is possible with one shot of grease. The new Permite adjustable spring shackle is available for all popular makes and models of passenger cars and trucks.

## Three Miles Down!

For years oil men have been talking about drilling a well three miles deep. Three miles is exactly 15,840 feet—now there's an oil well at Wasco, California, which has been drilled to, and is producing from, 15,010 feet below the surface!

Drilling began about 10 months and \$300,000 ago. On January 31, 1938, the well equalled the world's record, 12,876 feet, and drilling was halted by temperatures of 225 degrees, and up. Difficulties were overcome, however, and drilling was resumed at the rate of 50 feet of six-inch hole a day. On April 12 last the presence of oil indicated that the \$300,000 had not been entirely wasted, and that eventually oil in paying quantities might be brought up through the 175 joints of steel casing, each 90 feet long.

It will require the sale of 7,500,000 gallons of gasoline, equivalent to the annual consumption of 10,000 passenger cars, to pay the cost of drilling—alone. That is, if the seller can make as much as the tax collector—four cents a gallon!

## Get DURO PHILLIPS TYPE SCREW DRIVERS ★ FOR ★ THESE SCREWS



Natural Wood  
Handle with  
deep flutes.

Duro Grip  
Handles of  
handsome  
ebony black  
moulded plas-  
tic, properly  
shaped.



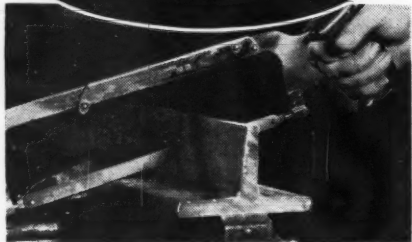
DuroLite Transparent Handle  
is the best looking as well  
as toughest handle to be  
had on tools of this type.

More and more manufacturers are using Phillips screws. They are here to stay. Equip your kit with screw drivers especially made for them. Duro offers you a choice of three popular handles fitted with the finest tempered steel blades—either polished or cadmium plated. Send for catalog showing these screw drivers and many other interesting Duro Chrome Tools.

**DURO METAL PRODUCTS CO.**  
2694 N. KILDARE AVE.  
CHICAGO, ILL.

## It's A Tough Life BUT TEETH THAT BITE

*Don't Weaken!*



● Cutting metal . . . forcing steel through steel . . . is a saw blade's toughest assignment. When you get a blade that can't "take it" on such work, production schedules suffer . . . there is too much time out for changing blades . . . and too many blade purchase orders per job.

Save the time and money losses of too much time out for blade changes by specifying Atkins Blue End Hack Saw Blades. They combine the advantages of *teeth that bite* with the stamina found only in Silver Steel. That's why we're able to guarantee that they will cut more metal easier, faster and better than any other blade you can buy. It also explains why hack saw users who once experience the speedy, effortless performance of *teeth that really bite* . . . their ability to operate for long periods on metal that other blades will not touch . . . quickly get into the habit of saying, "Atkins Blue Ends".

**E. C. ATKINS AND COMPANY**  
423 S. Illinois St., Indianapolis, Ind.



**ATKINS**  
*Silver Steel*  
**SAWS**

CERTIFIED SAWS, SAW TOOLS,  
MACHINE KNIVES, ETC.

## Steel Segment Ring Cures Oil Consumption

A new piston ring recently introduced by the International Piston Ring Co., 2401 West Superior Avenue, Cleveland, Ohio, is claimed to correct complaints of excessive oil consumption without the necessity of reconditioning cylinders. The new ring, as described by Harry Gray, president of International Piston Ring Co., is composed of two steel segments with a cast iron oil ring between. An inner ring backs up the entire unit. All three sections have equal pressure against the cylinder wall, thus reduc-

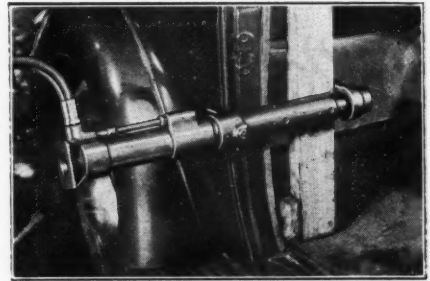


ing any excess wear that the steel segments alone might cause. The cast iron section is well ventilated with ample slots and is beveled on the upper side in such a manner that the upper steel segment has plenty of clearance to act as an individual scraping unit. This combination is said to permit each section to function individually so that excess oil can be scraped from the cylinder wall regardless of its shape due to excessive wear.

## Circulates Air In Rear of Car

The Stewart-Warner Corp., 1826 Diversey Parkway, Chicago, Ill., maker of the South Wind car heater, has announced a new South Wind Re-Circulator, an electrically-operated accessory which brings front seat warmth to rear seat passengers. The re-circulator supplies no heat itself. It forces the warm air supplied by the heater on the dash down into the pocket of cold, dead air which envelops the feet and legs of rear seat passengers. At the same time it eliminates the blanket of stifling, over-heated air which gathers around the heads of occupants of both front and rear seats.

The new device is mounted on the floor of the rear compartment of the car, just behind the driver's seat. It is controlled by an electric switch on the dash, and connecting wires are hidden under the floor carpet. The manufacturer claims it reduces the average difference between roof and floor temperatures to 7 degrees.



## POWER PLUS Will Handle Jobs Requiring Direct Pull

Perfection Power-Plus Hydraulic Jack and fittings will supply direct pull—concentrated to a one-inch radius—for the repair of box channels, rear trunk racks, door posts, etc.

Two modern Hydraulic Perfection Power-Plus units will tackle any type of body aligning, frame work, fender straightening, knee action adjustment, steel running board straightening.

Speed, Power, Dependability, Accessibility, Adaptability—you'll find all five in the Perfection Power-Plus Jack, the only double-acting PUSH-PULL hydraulic jack.

**G. A. C. MANUFACTURING CO.**  
ASHLAND, OHIO

**HOOK-ON**  
Repair Muffler  
Blow-outs  
in 15 Minutes

Heavy gauge, asbestos lined, 12-inch "HOOK-ON" Muffler Shoes slip completely around rusted or blown-out section. Fit 4", 5" and 6" round muffler with wide over-lap. Beaded ends and formed clamps give perfect seal. Low cost, big profit.

For Feeds we recommend patented No. 49 (over-all) Repair Jacket, covers complete muffler (telescopes to length, laps around). Looks like new muffler. Your jobber or direct.

6 No. 50 Universal Shoes \$3.60 (net dealer cost).  
6 No. 49 Ford Over-All Jackets \$5.40 (net dealer cost). Shipped postpaid if check accompanies order.

**SPRING SPECIALTY CO.**  
7 N. 8th Ave., Maywood, Ill.

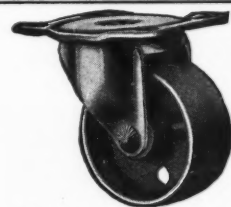
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**Flex-Stone**  
REG. U.S. PAT. OFF.

## CONTACT POINT DRESSER

Flex-Stone is now a recognized necessity for the garage mechanic. It bends into awkward corners and when it gets there it cuts. Takes the hardest of tungsten. Not brittle. Hard and keen. Durable. Not expensive.

Ask your jobber or write to  
**RINCK-McILWAINE, INC.**  
16 HUDSON ST., N. Y. C.



**25¢**  
EACH

No. 200A Caster is ideal for garage use. 2½" high overall; 1" tread, full ball-bearing; rugged construction. Order now!  
**NATIONAL MACHINE & TOOL CO.**  
JACKSON, MICH.